DECEMBER 1961

UNITED STATES ARMY AVIATION DIGEST

U.S. ARMY AVIATION SCHOOL MUSEUM
FORT RUCKER, ALABAMA 36360

Season's Greetings

United States Army

AVIATION DIGEST

DECEMBER 1961
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NUMBER 12

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??? HISTORY ???

The U. S. ARMY AVIATION DIGEST is preparing a comprehensive history of Army Aviation to present in the June 1962 issue, the 20th Anniversary of Army Aviation.

To compile such a history we are depending upon those who are personally interested to supply us with original information and pictures.

We are interested in any anecdote concerning Army Aviation history. Upon request any material or protographs submitted will be returned as soon as copies can be made.

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The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine and other related data.

Manuscripts, photographs, and other illustrations pertaining to the above subjects of interest to personnel concerned with Army Aviation are invited. Direct communication is authorized to: Editor-in-Chief U. S. ARMY AVIATION DIGEST, U. S. Army Aviation School, Fort Rucker, Alabama.

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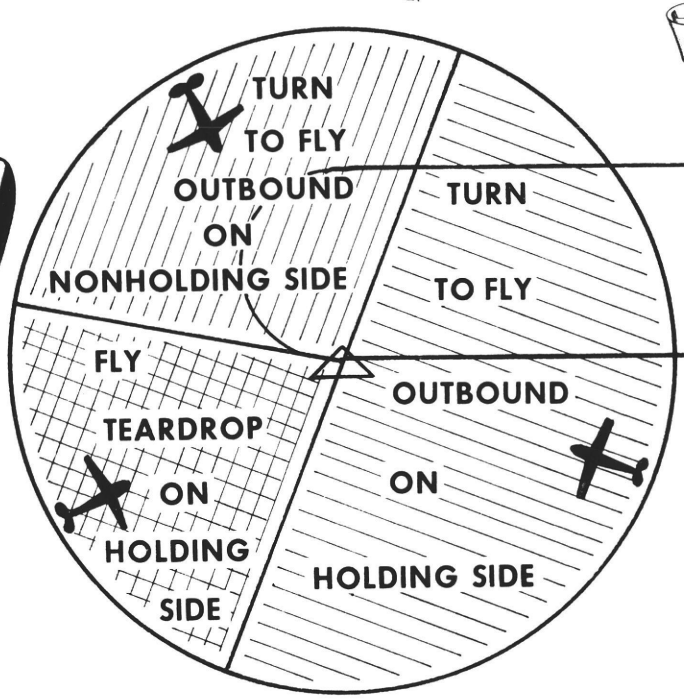
ANNUAL AWARD
Monthly Winner
CONTEST

HOLD IT!



Lieutenant Lloyd H. Morgan, TC

JACKSONVILLE CENTER, Army 27735, Rio, over."

"Army 27735, Jacksonville Center. Have further clearance, over."

"Army 27735; go ahead, over."

"ATC clears Army 27735 to hold northwest of the Jonesville VOR, on the 340° radial, descend to and maintain 2,000 feet, expect approach clearance at 45, over."

After reading back the clearance Captain Flyhigh turns to his copilot and says, "Hey, Joe, figure out my headings for the procedure turn."

"What for? Don't you know that procedure turn business is ancient history? I see you aren't keeping up on the new procedures."

"New procedures! Why I've always used the standard procedure turn. They taught that at flight school."

"Well, things change you know. FAA has published some new procedures to save time and airspace. Let me fly this one, and I'll tell you about them when we get down."

Joe was right about the FAA having new procedures, but the old procedures aren't ancient history, at least not until 1 January 62. Beginning on this date, the new procedures for aircraft holding will be mandatory. A number of changes and new methods are to be used, but only the procedures that most greatly affect Army Aviators will be discussed. Such things as DME holding, procedures for high speed aircraft, and procedures above 14,000 feet will not be covered.

- A change will be made on the Standard Holding Pattern. As before, it is made up of right hand turns, but the time for a standard leg will be **one** minute. And now a pilot may compensate for an extra strong headwind on the outbound leg of his holding pattern. He will be allowed to extend his time outbound if his time inbound is too short. The amount of extra time allowed on the outbound leg depends on the speed of the aircraft.

Speed Aircraft	Max Wind Allowance
Over 130 k	30 seconds
130 k or less	60 seconds

Lt Morgan is an instructor in the Academic and Synthetic Trainer Division, Dept of Adv F/W Tng, USAAVNS. He is fixed wing qualified.

• New procedures for entering the holding pattern have also been released. There will be three basic ways of entering the holding pattern; the one to be used will depend on the **track** of the aircraft as it approaches the fix. A pictorial summary of the entries is shown in figure 1.

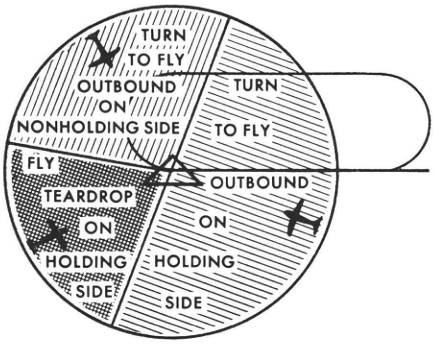


Figure 1

To simplify discussion of the entries, figure 1 will be shown in 4 sections as each entry is discussed.

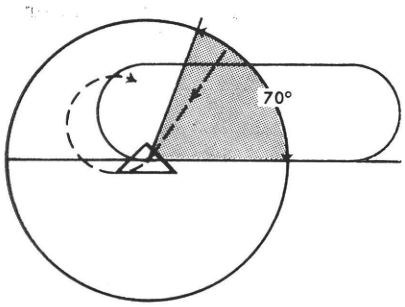


Figure 2

Figure 2 shows an aircraft entering from the holding side on a track that is within 70° of the holding course. Using the new procedure, the pilot would turn the aircraft to the outbound heading on the holding side. When the aircraft crosses the fix, it is considered to be in the holding pattern and the time outbound will start at 90° to the holding course.

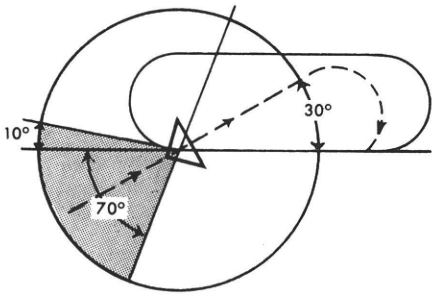


Figure 3

If the aircraft arrives at an angle of more than 70° to the holding course, but up to within 10° of the reciprocal, the pilot would turn the aircraft to the outbound heading on the nonholding side (fig. 3). After turning to this heading, maintain the course for one minute or less, timed from the fix, then turn and intercept the inbound course to the fix.

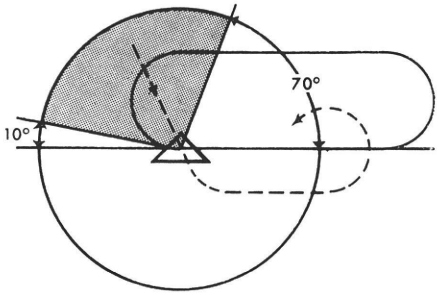


Figure 4

When entering at an angle of 10° or less to the reciprocal on the holding side, or less than 70° to the reciprocal on the nonholding side, a teardrop should be used (fig. 4).

An outbound track of approximately 30° or less to the holding course should be used for the teardrop and the time outbound from the fix not over one minute plus increase for known headwind.

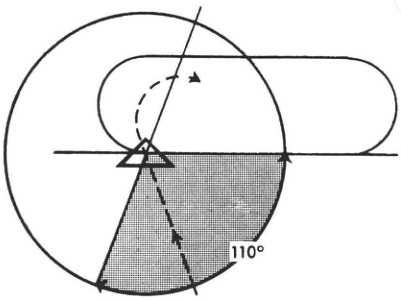


Figure 5

Arriving at the fix on the nonholding side at an angle of 110° or less to the holding course will require a turn outbound on the holding side (fig. 5). Here the time starts for the outbound leg just as it does when in the holding pattern. Establish the 90° point and begin the time. When the time is up, begin a turn to intercept the inbound course. If the 90° point cannot be established, use a one-minute outbound course starting the time over the fix. This will occur when entering very close to the 110° point from the holding course.

These are some of the main points included in the new FAA procedures. Each aviator should acquaint himself with them before they go into effect on 1 January 62. It is permissible for the new entries to be used before this time. Don't be like Captain Flyhigh; learn these new procedures now.

(The complete procedures by FAA may be found in the July 8, 1961 issue of the "Airman's Guide.")

This is the time of year to be especially watchful for patches of wispy fog which can lower visibility drastically.

Nilsweat and the Maps

Nilsweat Relates Another Episode Of His Famous Flying Ability

Captain Lowell Mikles

WELL, I'll tell you about a real hairy one I got into just recently which, but for my vast knowledge of things aeronautical, might have cost my ole Uncle Sam $100,000. The operations officer called me in and told me that it was my turn for a RON flight and that I had to take the chaplain down to Scraggsville and bring him back the next day. He said I could use the L-23, since it was a rather long flight and the plane needed the time on it.

Now that L-23 Dog is a real machine and I'm pretty good with it. Just the other day I brought one in on a single engine after some fool left off the oil cap on number two. Yeah, and ole Major Axident just raised the roof! He kept mumbling about a stupid so and so that would let something like that happen. I agree, too. Matter of fact they oughta fire that mechanic.

Well, to get on with the story, I got me a copilot for the flight, and we started in on the planning—you know, two heads are better than one. Neither of us had ever been to Scraggsville before so we really studied this one out. We gave it the professional touch that Aviation Safety Officer keeps yaking about. That guy really watches me—I figure he's picking up good points to pass on to the boys in the backroom.

I always have my copilot plan the flight; it's good experience for him. Of course, I look it over to see if he goofed anywhere. I told him to plan this one airway all the way since we didn't know the route; besides it is so much easier to navigate by radio. This L-23 Dog model is loaded with communications and navigation equipment. Nobody but an idiot could get lost and stay lost with all that gear and the Jepp Manual.

The next morning I arrived early, 20 minutes before takeoff time, got my Jepp case and headed for the airplane. My Jepp case is real gone; I carry extra pencils, writing pad, flashlight and batteries, TL-29, and even a razor. I am always ready. Of course, I've learned these things the hard way, one at a time; none of this second hand experience for me. This flight was a 5-hour job, bucking a 20-knot headwind, but good VFR all the way, real field grade weather. I really checked those oil caps this time; I'm sold on that one now. I questioned the mechanic on the gas, too. He assured me it was full.

I went up and got ready to greet the chaplain. I always meet my passengers with a fancy salute; it impresses them to start with. He introduced himself, and when I told him my name he looked real impressed. He seemed to tremble a bit — in anticipation of the flight, I guess. I told him about the flight on the way to the plane, and that he was in good hands.

After the mechanic closed the nose compartment door, I got the plane started. He should have closed it before I got there. He knows you can't complete the electrical circuit in the starters till you do. And that copilot — man, don't ever ask him to go with you. He kept trying to read off that checklist to me. I don't use that thing; it has a whole bunch of little things that don't have anything to do with starting it anyway.

After the copilot turned on the generator switches, I got the tower and taxied out for runup. I rushed right on through that. I can really get

Capt Mikles wrote this article while a student at the University of Southern California Safety Course.

a runup over fast—costs money to keep 'em running on the ground. But that darn copilot kept reaching over and pointing to things. He was still reading that checklist. I gave a few reassuring glances at the chaplain, who was bored with the whole thing, judging from the pale look on his face.

I poured on the coal and we were off into the blue. I pulled a little bit extra on the manifold when it looked like we were about out of runway, and the copilot asked me if I always took off without flaps. I made a couple of quick banks to clear a helicopter that was coming in from somewhere, and started the climbout. I heard the chaplain give a big sigh of relief and when I looked back his eyes were really shut tight. Real confidence in the pilot.

We climbed right on up to altitude; 8,000 feet for going west, you know — fly the old altitudes right. It was about then that smart aleck copilot said something about 8,500 feet and I cooled him off but fast. You have to watch these bright boys; they are always reading something. About 2 hours out I gave a position report to this Podunk radio and that groundpounder tried to convince me that I should be at 8,500. Naturally, I stuck to the guns; my experience hasn't ever let me down. Besides 500 feet isn't much, up in the air like that.

I checked on the chaplain. He was awake then and fumbling around on the floor. I told him that it was that little black funnel with the tube attached. It was about then that the omni flag went up, the interphone went dead, and smoke began to come out in the cockpit. I went into action, cut off both engines to see if that was the trouble, but the smoke kept coming out. I just about had it traced down, so I quickly cut both mags back on. She overrevved a little, but I brought it under control. I cut off all the electrical switches and the smoke stopped so I correctly diagnosed the problem as an electrical fire. I looked in under the instrument panel and saw that there was no fire and quickly decided to continue the mission. Little things like this don't bother an old hand like me.

That chaplain sure had a funny look on his face trying to wipe off the seat. I guess he had spilled a thermos of coffee. To put him at ease I told him he could just pour the rest down that little funnel he still had in his hand in case he had lost the cork. I didn't quite understand what he said as the copilot had noted that we were slightly off the heading by about 90 degrees. I immediately asked him where we were and he said about 20 minutes past Dry Gulch radio and we had about one more hour to go on our ETA.

I naturally wanted a little better position than that and took over the Jepp chart myself. I did a fast E-6B problem in my head and located myself and took up a new course to bring us into Scraggsville by dead reckoning. I handed the chart back to bright boy and told him to check my calculations on the sectional map of this area. For some reason he started looking in my Jepp case and came up with a question about where were my maps. I never carry maps since the Jepp charts came out — you know, all this new communications and navigation stuff in all the planes I fly. Besides it is SOP in my outfit to have maps of the area in every aircraft. I spoke sharply to the copilot and set him right on that point. I was really surprised when he told me that the only sectionals in the plane were of the local area. Naturally I chewed him out quite roundly for not bringing maps for the flight and he tried to put the blame on me, saying that I was the pilot and it was my responsibility.

The chaplain got into the act after overhearing me straighten the copilot out and wanted to know where we were. I was able to put him at ease by telling him we were about 30 minutes out. He asked me to show him on the map and then he got a little bit shook when I explained the map shortage to him, and how it was the fault of maintenance and operations for not having them in the plane. I appreciated the tailend of his remark—something about idiot. I felt the same way about those so and so's who didn't put any maps in the planes.

After flying about another hour in sort of a box-like pattern which I learned to do many years back, I spotted an airport and made a rapid descent right onto the downwind to save gas as my 6 hours of fuel was pretty close now. I was sure glad that the mechanic knew his business when he assured me that the tanks were full.

On my final approach the tower gave me a red light and I immediately made a go-around while my copilot was manually extending the gear. I guess he forgot to mention when I put the gear handle down that we had no electrical power. I made my usual landing on the next try; you ca

really plunk them on a 3-point with a tri-cycle gear if you try. I immediately knew where we were when I read the name on the control tower and checked it on the Jepp chart.

The chaplain seemed to be in a bit of a daze, but he was meditating, I guess. I offered to take him right on to Scraggsville as soon as I got fuel and a map, as it was only 100 miles north of our location. He very kindly thanked me and got my name in his notebook. I feel sure that I will come into some special sermon of his on courage and faith any day now.

I called the operations officer collect and explained what happened. He must have mentioned my good judgment and quick thinking in an emergency to Major Axident, for I heard a loud roar of approval in the background, also something about damned idiot. The operations officer told me to sit right there and not to move the plane. I let the copilot know how Major Axident had spoken of him.

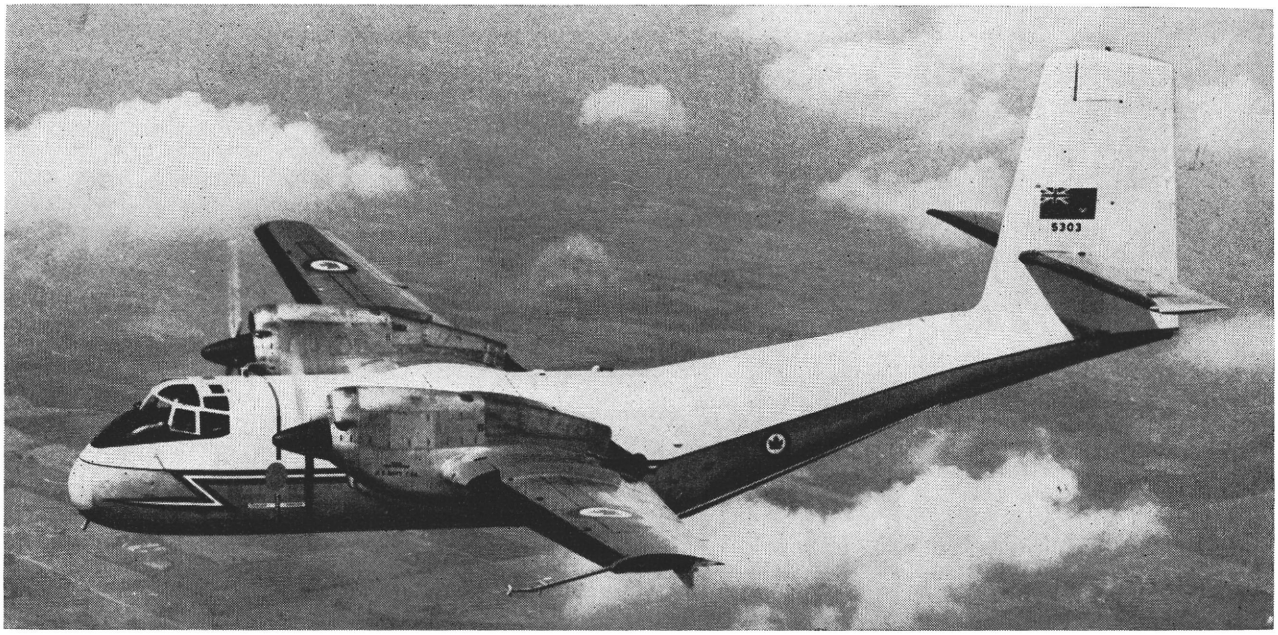
Old Axident told me later that with that last episode and this no map deal that I had better ride copilot as we had lots of young pilots that showed much more promise. I know that he meant that I could keep an eye on them and set them straight.

You know I always profit from my mistakes. I only made one small oversight on that flight. I just forgot to check on someone's work. They should have put those maps in the plane. I carry a set in my Jepp case now — covers about half of the U. S.

Say, you know, I must be in store for a good deal. Old Major Axident and that aviation safety officer talk to me every day now. I'm relating some of my experiences to them and they seem more and more amazed. Maybe there will be a new manual on how to get out of emergencies, or something like "Cooling it on Your Flight with Nilsweat."

See you around, buddy. Here they come again and this time they brought the flight surgeon with them. I know he'll be amazed to hear about how I get out of these little emergencies that pop up.

Caribou's First Turbine-Powered Flight



A Caribou was recently used as a flying test bed for the first flight test of General Electric's T-64 engines. The flight lasted 1 hour and 20 minutes at altitudes from 4,000-12,000 feet.

The flight test program is being conducted by General Electric and de Havilland under sponsorship of the U. S. Navy for whom the engine is being developed, and with the cooperation of the Canadian Department of Defense Production and the RCAF.

Report on BOOTSTRAP

Captain Theo C. Watkins, TC

With increased emphasis on advanced education by the Department of the Army, the DIGEST feels that this firsthand report on aviation schooling will be beneficial to Army Aviators contemplating BOOTSTRAP. The well educated aviator will be a safer pilot, a better supervisor, a more well rounded commander.

THE COLLEGE DEGREE Completion Program of Operation BOOTSTRAP places a baccalaureate degree within the grasp of all interested, active duty personnel. Several colleges offer a BOOTSTRAP program; however, this article is directly concerned with the program as administered at the University of Omaha, Omaha, Neb.

REQUIREMENTS

A total of 101 semester hours are required for consideration and acceptance under the final semester plan by the University of Omaha. Sound formidable? It's not. The hours may be attained as follows:

- 36 semester hours of college credit (minimum)
- 30 hours credit for a commission
- 24 hours (maximum) for GED tests (provided scores on tests are high enough)
- 11 hours credit for various service schools

101 Total (other combinations are possible)

As indicated, you must have a minimum of 36 semester hours from an accredited college or university. Credit for Army service schools is as computed in the American Council of Education (ACE) guide book. The branch advanced course, Command and Staff College, and many technical courses are creditable toward the 101 hours.

Two additional bits of information: course grades below C are not acceptable; and 24 resident semester hours are required at the University of Omaha, regardless of your total cumulative semester hours from all sources.

ADMINISTRATIVE PROCEDURES

AR 621-5, as changed, outlines procedure for attending BOOTSTRAP and has a sample application form, which is self-explanatory. Your first step, however, is to visit your Education Officer for an educational evaluation form. Most Education Officers are well acquainted with the Omaha requirements and are able to furnish a quick evaluation of your status.

List ALL the service schools attended. Have this form certified by your personnel officer and as outlined in AR 621-5 forward along with your college transcript to the Registrar, College of Adult Education, The University of Omaha, Omaha, Neb.

In a few days, if you are eligible, you will receive a letter of acceptance.

COST

First, let me remind you that all TDY travel and expenses are borne by you, at no expense to the government. Realizing that this item can be extremely nebulous due to vari-

---

Capt Watkins is now assigned to the 41st Transportation Battalion, APO 185, N. Y. He is a Senior Army Aviator with over 4,000 flight hours.

ables, the figures quoted do not include parties and Class VI supplies. In addition, advice on taking or leaving the wife is purposely excluded. For the record, my family went along.

So much for the attempt at levity. Tuition (including non-resident fees) runs $15.00 per semester hour. Remember, you must have 24 hours in residence. Laboratory fees are extra, as are matriculation, graduation, and student activity assessments.

Rent for an average 3-bedroom, furnished house runs approximately $150 per month, plus utilities. Food and clothing costs may vary up or down from those at your last assigned station. In my case, they were somewhat lower.

To epitomize on cost, the total cost (excluding exceptions) will run around $3,000 with family. The educational and TDY expenses are deductible from your income tax.

One word of caution, locate on the northwest side of Omaha. The winters on the great plains of Nebraska are severe, and you may have to walk to school.

Offutt Air Force Base is 8 miles from the city limits. Incidentally, they will without equivocation give rated personnel of any service, a simple 10-hour checkout in the twin 310.

PERSONAL OBSERVATIONS

First, let me destroy some illusions. The 6 months TDY is not a sinecure. You must carry 18 semester hours during the regular semester, while your civilian contemporaries (seniors) are carrying 15 or 16. Also their schooling has not been interrupted, so most of us "Bootstrappers" have to dig harder. Six semester hours are required in five weeks during the short term, without a reduction in the curriculum.

Along this same general line of thought, a widespread misconception exists concerning the Bachelor General Education (BGE) degree which is awarded upon completion of the course. Many people view it as a "box top" baccalaureate degree. This notion is entirely fallacious. The university is fully accredited, as are all its colleges, including the College of Adult Education. It is more progressive than many universities; hence, the additional credit awarded for some Army Schools. The ACE guide is used in computing semester hour credit for Army schooling. Once granted, it is transferable to any accredited American college or university.

Upon matriculation at Omaha, you wear civilian clothing. Except for somewhat balder heads (especially mine) and the widespread appearance of black low-quarter shoes, bootstrappers mingle indistinguishably with the 7,000 student population.

One item of usual interest: FLIGHT TIME may be obtained through the XVIth U. S. Army Corps (Reserve) or Offutt Air Force Base.

Your degree is awaiting you, less than 8 months away from this reading. Department of the Army has outlined the formal schooling guidelines for promotion and retention. Over 400 bootstrappers are currently enrolled from all services at Omaha. The opportunity is available. The decision is in your hands.

YHU-1D Makes First Flight

The YHU-1D, latest model in the Iroquois series, is shown during its first flight.

The new model is now ready for its Phase I flight test program.

Production model of the ship will be called the HU-1D.

Powered by a Lycoming T-53-L9 engine of 1,100 shaft horsepower, the HU-1D will carry a pilot and 12 fully-equipped battle troops, 50 percent more than the HU-1B. It will retain all dynamic components of the HU-1B, making maximum use of existing hardware, thereby lending itself to current production tooling techniques.

The HU-1D will feature the same compactness, low silhouette and transportability by cargo plane as earlier Iroquois models.

. . . crashed and BURNED!

Captain Cecil H. Grimes, MSC

A SHAWNEE crashes with impact forces well below those a human can stand; yet the crew perishes. Why? The answer is FIRE — IMPACT FIRE, long the most dreaded and fatal element in all crashes. This is doubly so for chopper accidents which result in fire more than twice as often as fixed wing accidents. Fire played its grim role in 7 percent of 579 Army rotary wing accidents during a recent 3-year period (1957-1960). Forty-two fire accidents resulted in 41 fatalities, **63 percent of the total killed in all 579 accidents.** Records prove your chances of surviving a helicopter crash are 22 times as great if there is no fire.

A typical example of a fire accident took place during an H-19D Chickasaw flight. The aircraft, on a cross-country to make a passenger pickup, arrived at its destination airfield and entered traffic to land. During final approach, at an altitude of approximately 150-200 feet, the engine failed. The pilot hurried through the emergency procedures and entered autorotation. Just before touchdown, the aircraft was flared slightly to reduce groundspeed and pitch was pulled to soften the landing. But this action failed to slow the rate of descent and the Chickasaw landed hard, bounced, rolled and burst into flames. It came to rest on its right side.

The copilot jumped out and rolled on the ground to put out the fire eating at his clothing. He then crawled back into the cockpit, helped the pilot out and began searching for the crewchief. The crewchief was found struggling to get out of the flames and trying to extinguish the fire covering his body. He had either jumped or been thrown out of the aircraft during the crash sequence. His injuries consisted of third-degree burns over 90 percent of his body; he died a week later. The pilot and copilot survived with severe burn injuries. **Had there been no fire, there would have been no injuries from this accident.**

Currently the world's largest operator of rotary wing aircraft, the Army has a heavy stake in the continuing effort to increase the crashworthiness of helicopters. This effort must be directed toward the machines because, to date, there is no satisfactory inflight escape system. When engine failure or some other malfunction makes further flight impossible, pilot, crew and passengers are committed to ride the aircraft down. Unless solved, the problem of helicopter postcrash fires will grow in direct proportion to the increasing inventory. Rotary wing aircraft now make up 50 percent of the Army's fleet, but plans call for an increase to 75 percent by 1970, plus a build-up of the total inventory.

One of the most effective means of solving the postcrash fire problem lies in research of past accident experience. The Analysis and Research Division of USABAAR is responsible for this important task. Accident reports are channeled through the Operations and Training, Engineering and Human Factors Sections for review and analysis. Data gathered from this process is fed to the Automatic Data Processing Section where it is coded to IBM cards and becomes a readily available source for research studies. Statistics used in this article were drawn from this system.

Captain Grimes, a dual and multiengine rated Senior Army Aviator, is the crash injury analyst for the Human Factors Section of USABAAR.

FIRE CAUSES

Army aircraft accident investigators face an extremely difficult task in determining origins and ignition points of fires. **Example: An H-13G Sioux crashes and burns. You find that both fuel tanks ruptured in the crash and fuel lines were broken in several places.** Where did the fire originate? What ignition point set it off? The only honest answer you can give is that you don't know. It's virtually impossible to pinpoint the exact origins of postcrash fires. What you **can** do is bend every effort to come as close as possible to general sources of fires. Then, if you can't point to the exact origin, you can at least report that a fire was caused by ruptured fuel tanks or fuel lines, a malfunction in the engine compartment, an electrical short, or any of several other sources that will help to identify the general area from which the fire started.

Using this system, the 42 fire accidents mentioned in the first paragraph break down like this:

CAUSE FACTOR	NUMBER	PERCENT OF TOTAL
Ruptured Fuel Cells or Lines	33	78.5
Malfunction in Engine Compartment	7	16.7
Grass Fire (ignited by heater exhaust)	1	2.4
Unsecured Fuel Tank Cap	1	2.4
TOTAL	42	100.0

It is immediately apparent that the greatest effort is needed in the design of crash-fire-resistant fuel systems. Recommendations in the area include:

FUEL LOCATION

It appears that fuel location has been a design afterthought in the manufacture of helicopters, with tanks placed in whatever area is not taken up by some other major component. Some aircraft even have fuel tanks mounted under the cabin floor. With no protection, they are highly susceptible to rupture from impact forces and protruding structures, such as gear struts.

In addition to location, consideration should be given adjacent components. Items such as transmissions and engines can easily rupture or ignite fuel tanks during a crash sequence. Proximity of the transmission to the fuel system is a vital factor. Forces transmitted from rotor blades to transmissions when the blades strike such items as trees, cables, or the ground are usually of extreme magnitude and frequently displace the transmission or force it completely out of the aircraft. Damage to surrounding

components is usually severe.

USABAAR initiated research in break-away fuel tanks for those helicopters with external fuel storage. To determine the feasibility of this idea, the Engineering Section has a fibreglass-reinforced plastic tank fabricated for installation on the H-13. Fibreglass tanks are electrically nonconductive, heat resistant, and show promise of great inherent strength. These tanks are mounted with the center of gravity laterally positioned, and mounting straps are engineered to fail at the turn buckles when impact forces are 5 g or greater. During a crash landing, the tanks are thrown outward and forward due to impact and the slanted design of their mounts. Aviation Crash Injury Research, a division of the Flight Safety Foundation, has conducted drop tests of this configuration with promising results. Further drop tests are planned for the future.

The need for this type of fuel tank is evidenced by the following accident.

A reconnaissance helicopter, with pilot and observer aboard, had completed its mission of flying cover for a motor convoy and the pilot was looking for a place to land. He flew over a location beside the convoy that appeared to be a good landing site. During his low reconnaissance, the helicopter struck powerlines, shattering the bubble. The drag of the wires, before they broke against the console, caused the main rotor blades to flex violently and sever the tail boom. The aircraft crashed in a right bank attitude and came to rest approximately 78 feet from the point of initial impact.

The pilot heard an explosion just after contact with the wires and another shortly after ground impact. Grass burns indicated the fuel tank was ruptured at initial impact. Fuel spilled over the hot engine and burst into flames. The pilot and passenger were left unprotected by the shattered bubble and were drenched by splashing fuel. When the aircraft came to rest, they unfastened their shoulder harness and safety belts and ran from the flames. Gasoline that had splashed over them was burning. Both sustained second and third degree burns over 30 to 40 percent of their bodies. **Thermal injuries, the only injuries involved, could have been prevented by properly functioning break-away fuel cells.**

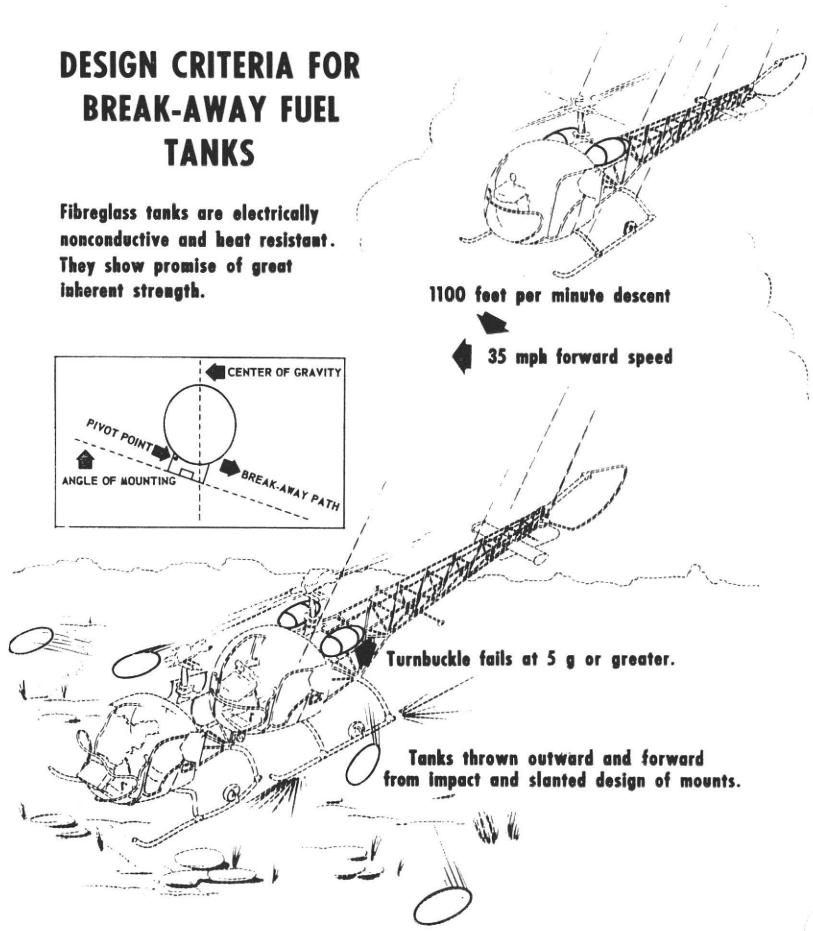
TANK CONSTRUCTION

Self-sealing fuel tanks, intended primarily for combat conditions, are designed with two bladders, one inside the other. Between the bladders is a sealing substance which will plug puncture-type holes. This is the sole characteristic of self-sealing fuel tanks.

Crash-resistant tanks are designed to reduce personnel injuries and aircraft damage by absorbing or resisting crash forces and preventing rupture. This type of system provides protection throughout the life of each aircraft — during test and development, training, peacetime operations, and combat. Crash-resistant fuel tanks should be designed with the

DESIGN CRITERIA FOR BREAK-AWAY FUEL TANKS

Fibreglass tanks are electrically nonconductive and heat resistant. They show promise of great inherent strength.



minimum thickness and weight necessary to contain the fuel and meet strength requirements of the airframe. A rubber fabric, for example, would have a high degree of crash resistance due to its ability to deflect under inertia loads.

French experience in Algeria and Indo-China substantiates a need for crash-resistant fuel tanks over the self-sealing type. It was reported that effects of small arms fire do not substantiate a need for self-sealing tanks, because crash fires were the major problem. A summary of French Air Force experience indicated 88 percent of the bodies found in crashed helicopters were charred or burned. At least one-third of the deaths were attributed to burns. Practically all major crashes ended in fire. USABAAR has concluded that more protection could be provided by requiring crash-resistant fuel tanks rather than the ballistic-proof type.

FUEL ENCLOSURES

Energy-absorbing material should surround fuel locations. Impact forces can be reduced by incorporating honeycomb structures. This material can be lightweight, such as aluminum or fibreglass-reinforced plastic. Rigidity, strength and resistance to burning of fibreglass show considerable promise for its use as an ideal energy-absorbing material.

The HU-1 Iroquois is equipped with crash-resistant fuel tanks. Iroquois accidents have resulted in considerable damage to fuel tank areas without rupturing the bladders. Added to its aft location, this feature is considered the primary factor in giving the HU-1 its outstanding record to date.

FUEL LINES

Primary fuel lines leading from fuel tanks should have self-sealing disconnects. These should be incorporated between each compartment through which fuel lines pass and they should be the weakest points in the lines. This feature will result in the separation of fuel lines at the self-sealing positions before the lines are ruptured.

FUSELAGE CONSTRUCTION

Weight has always been a prime consideration in helicopter design. To reduce weight, manufacturers have used the lightest available material which had the required strength properties. Magnesium has been a popular metal for this purpose. However, because of its low kindling point and fast rate of burning, other alloys are generally recommended. If cabin areas are constructed of an alloy with a higher resistance to ignition and slower rate of burning, the time between ignition and fire reaching occupied areas may be the difference between escape or thermal injuries.

TURBINE-POWERED HELICOPTERS

Helicopters now in the design stage are known as "third-generation" helicopters. These will create new and different fire problems. One such problem already with us concerns the use of JP-4 fuel. Turbine engines require greater fuel loads than reciprocating engines for flights of comparable endurance. The fuel-air mixture or vapor of JP-4 is combustible under most operating conditions of temperature, pressure, and altitude. This is in contrast with gasoline or kerosene vapors which are normally either too rich or too lean and have a more limited combustion range for pressure, temperature and altitude combinations.

Postcrash fire, responsible for fatalities, injuries and excessive aircraft dollar losses, is one of the major problems facing helicopter users. The Army recognizes this problem and is fighting to solve it with every available resource. This will not be accomplished overnight, nor will it be solved alone. Only through the full cooperation of all interested agencies and redoubled effort will crash fire hazards in helicopter operations be reduced to an acceptable level.

Answers to ATC Quiz

1. **d** Ref: ATM 2-A, 206.1
2. **d** Ref: ATM 2-A, 264.2
3. **b** Ref: ATM 2-A, 424
4. **c** Ref: Vol. #1 Jeppesen Manual

Are You A Cockpit Informer?

Captain Paul B. Malone, III, Inf

GENTLEMEN, for obvious flight safety reasons, Army Aviation communications on this field exercise will be administrative in nature." How many times have we participated in this compromise with tactical realism? How many times have we witnessed the resultant destruction of communications security by aviators while participating ground units, often operating on the same frequencies, studiously follow proper procedures?

Aviators, actually some of the best and most experienced communicators in the Army, are faced with some real and severe problems where communications security is involved. Peacetime communications procedures with standard aviation facilities very naturally stress clarity with complete disregard for security. Dependence upon the radio for incidental and purely administrative traffic has encouraged nonstandard techniques and frequent sacrifices of brevity.

Unlike the Air Force pilot whose contact with specific ground units is usually short-lived, the Army Aviator's mission includes continual living, moving, and COMMUNICATING WITH supported organizations. Further complicating this is Army Aviation's range and flexibility.

Capt Malone wrote this article while S-3 of the 82d Avn Bn, Abn (Prov), Fort Bragg, N. C. He is now serving in Korea.

An Army Aviator may support several ground units in one day, encountering a variety of radio nets. Many combat units have developed their own special systems and procedures, such as grid locator designators, which may well be foreign to an aviator expected to support them effectively.

In addition to this demanding general situation, the Army Aviator is faced with problems peculiar to his primary mission—safe flying. The H-13 pilot traveling alone at 60 knots, 50 feet above the ground, is in no position to be thumbing through a division SOI (Signal Operations Instruction). Even in aircraft with copilots, the rapid pace of a cargo helicopter troop lift makes compliance with elaborate and time-consuming communications procedures highly impractical. Of course, the situation is much different in an L-19 with pilot and observer 5,000 feet over the FEBA on a surveillance mission.

The solution to this problem appears to lie in the following general areas:

- Acquaint ground commanders with the problems and limitations facing supporting aviators. Develop procedures which are compatible to Army Aviation.
- Train Army Aviators to become continually aware of the need for tactical communications security. Attempt to integrate this training into day-to-day operations, reporting violations through command channels.
- Develop aviation communications techniques which achieve at least a degree of security. Basic requirements, in addition to the standard clarity, brevity and security, should include the following:
- Simple enough to commit a majority of prescribed data to memory.
- Capable of being changed simply and orally without creating undue confusion.
- Capable of concealing at least the identity, location, and general nature of activities. (It is realized that trained monitors will often identify aircraft by characteristic background noises and greater transmission power as compared with ground stations.)

The 82d Aviation Battalion of the 82d Airborne Division has devised procedures which have proved effective in training and may be a step in the right direction for all aviation units.

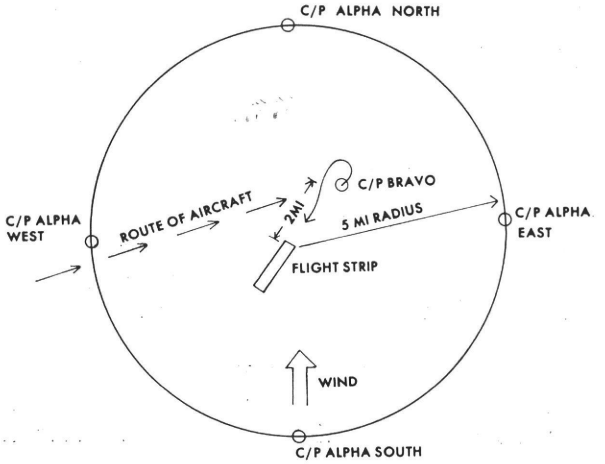
The procedures fall into the following facets of air-to-air and air-to-ground communications security.

Aircraft Designations. Each type of Army aircraft is given a call sign which can be changed at will. Only the last two digits of the aircraft serial number are used.

Authentication. To avoid the obvious problems in authentication, a very simple authentication system has been devised. The authentication is the **third** letter of the phonetic spelling of the first letter in the challenge. To avoid confusion with the division SOI, the code word, THUNDERBOLT is used. Example: "Authenticate THUNDERBOLT BRAVO WHISKEY." (The letter "A" is the third letter of BRAVO.) "Authentication is ALPHA-ALPHA." This system, which can be figured mentally, obviously achieves only partial security. The authenticating letter, however, can be changed at will.

Encoding and Decoding. Communications instructions for each battalion operations order include a code number for each 24-hour period in the field. During this period, this number is added to each letter or digit of a word or number being encoded. To decode, numbers or letters are subtracted. Once again, the term, THUNDERBOLT is used to identify the code system. Examples: On a "plus **three**" day to **encode** coordinates 135791, "Coordinates THUNDERBOLT 468024." Encode ANGRY: THUNDERBOLT DQJUB. To decode THUNDERBOLT DWRPLF, three letters would be

Figure 1. Landing Procedures (Day)
EXAMPLE: Wind is from the south at 5 k gusting to 10 k. The direction of the field strip is 200 degrees. To an aircraft reporting Checkpoint Alpha West, landing control gave landing instructions: "This is MANSLAUGHTER, 20, 18, 0510; report Bravo." Aircraft flies at altitude to Checkpoint Bravo, reports, and descends for contour approach to field.



subtracted from each letter—ATOMIC.

Terminal Control. Highly essential to any tactical aviation facility is a simple and effective method of terminal control. During tactical operation, this technique must avoid the orbiting of aircraft over the facility, thus disclosing its presence. Day and night procedures employed by the 82d Aviation Battalion are as follows.

Day: A series of control points are necessary for the implementation of such a plan (see fig. 1). These include checkpoints Alpha (N,E,S,W) which are points 5 miles (N,E,S,W) of airfield. Checkpoint Bravo is a point 2 miles downwind from the direction of landing. An aircraft reporting at any checkpoint Alpha is indicating it is 5 miles from the airfield and desires to land. Landing controllers, in turn, transmit a message in code while including landing instructions. These instructions, all in numbers, give information on the direction of landing, wind direction, and velocity, in that order. Example: "09, 07, 1015, report Bravo" means landing direction is 090 degrees, wind direction is 070 degrees, wind velocity is 10 knots gusting to 15 knots, report 2 miles downwind.

The aircraft then proceeds to checkpoint Bravo (2 miles downwind), executes a descending turn to contour altitude, and makes a contour approach to the airfield. Departures do not involve checkpoints but do include flying 2 miles at minimum altitude before climbing out. This system, actually quite simple when practiced once, provides a degree of security for the airfield location and avoids all use of standard aviation terms such as "downwind," "base," etc. The location of checkpoints Alpha and Bravo are based entirely upon pilots' estimations. These points can serve as holding points in the event of heavy traffic or emergency situations.

Night: For night operations, a checkpoint, Night Alpha, within 5 miles of the airfield is employed. This point is a geographical location, easily recognizable at night, and disseminated in the battalion operations order when an airfield is selected. Initial reports are made by aircraft at this location. Landing information is transmitted in the same format as during the day. From checkpoint Night Alpha, the pilot may land, utilizing any traffic pattern though obviously not employing contour techniques.

Code Words. In an attempt to obscure the exact nature of aviation activities, a series of code words have been developed. These must be committed to memory by each pilot. Encoded words are those terms normally used in aviation; code words generally parallel the meanings in other than aviation terminology.

AIRCRAFT OPERATION CODE

Clear Text	Code Words
Div Base A/F	Capital Hill
Satellite A/F	Sputnick
Alternate A/F	Second Best
Over (location in air)	At (location)
On ground (location)	On (location)
Orbit Area	Roundhouse
Runway	Turnpike
Taxiway	Lane
A/C Parking Area	Drive-In
Land (A/C)	Pull-In
Takeoff (A/C)	Move-Out
Go Around	Try again
Off Ground at	Out (at)
On Ground at	In (at)
Runway Lights	Smokers
Aircraft (all types)	Machines
Moving Hazard to flight	Target
Fixed Obstr to flight	Hurdle
100 ft. altitude	Ton
Winds	Score
POL Truck	Cow
FM Homer for__sec	Countdown for__Sec
Light Gun	Cat eyes
Panel(s)	Aiming Stake
Flight Plan	Dispatch
Pilot	Driver
Crewchief	Gunner
H-13	Touchdown
L-19, L-20	Trademark
HU-1A	Tiptop

UNCLASSIFIED UNTIL FREQUENCIES INDICATED

Code/Mission Cards. The card indicated on pages 14 and 15 (front and back) was found to be quite valuable and practical for battalion aviators. This card, breast pocket sized and covered with rough acetate for easy erasures, is

COMMUNICATIONS SECURITY INFORMATION

Number/Letter Code _____

A/C Call Sign _____

Frequencies _____

Agency	Call Sign	FM	FM Alt	UHF
FOC	_____	____	_____	____
ATC	_____	____	_____	____
GCA	_____	____	_____	____
HOMER	_____	____	_____	____
_____	_____	____	_____	____
_____	_____	____	_____	____

MISSION INFORMATION

Mission Number _____

WX _____

Route _____

Mission _____

_____

_____

REPORT SEQUENCES

_____, This is _____
(FOC call sign) (A/C call sign)

_____, _____, _____, over.
(Mission No) (Location) (Time) (Alt Opt)

_____

_____

ATC Reply

At Alpha _____, this is _____.
(FOC call sign) (ATC call sign)

_____, _____, _____.
(Landing direction) (wind dir) (wind speed)

Cleared to Bravo (Cleared to land) gusting to)

used by each aviator to record tactical mission information to include frequencies, call signs, and flight clearance features.

In addition, there is a format for reporting sequences. On the rear, all code words are listed for easy reference and review.

These procedures obviously involve many limitations. The necessary simplification limits the degree of security achieved. Use of the system is limited to interbattalion communications operating air-to-air or air-to-ground. If nothing else, however, the system does encourage security consciousness among battalion aviators. With some practice, they have used the system effectively without compromise of flight safety. Daily employment of these procedures over the battalion's continuously operating FOC net, with violations being posted for general dissemination, serves as an excellent training vehicle.

Peacetime training must be restricted by appropriate safety limitations. Army Aviators must know and use standard FAA procedures. Let us not assume, however, that communications security can be instilled in aviators overnight. The system just described is but one approach by one tactical unit. Surely there are others. Unfortunately many units disregard the problem. Let us see some command emphasis placed upon this subject in order that aviation's great potential will not be impaired by "Cockpit Informers."

ATC QUIZ

—submitted by Air Traffic Control Detachment, Airfield Command, Fort Rucker, Ala.

1. The longitudinal separation required for helicopter special VFR flight, regardless of the courses to be flown, shall be:
   a. ¼ nautical mile
   b. 2,000 feet
   c. 10 minutes
   d. 1 nautical mile
2. Which of the following communications contacts are expected of a pilot on IFR flight plan after release to approach control?
   a. Leaves approach fix inbound on final approach
   b. Leaves any specified reporting point, holding or approach fix
   c. Vacates any assigned altitude for another assigned altitude
   d. All of the above
3. Helicopters are considered to be air taxiing when they are moving from one point to another within airport boundaries, they normally will not taxi more than —— feet above the ground.
   a. 20
   b. 10
   c. 5
   d. 25
4. The second and third letter of the NOTAM code deals with:
   a. Airdromes and search and rescue
   b. Condition of facilities
   c. Radio aids, lighting facilities, airdromes, search and rescue, dangers to aircraft in flight
   d. Hazards or status of operation or condition of facilities, dangers to aircraft in flight

Answers on page 11

The Talented Army Aviator

Captain Thomas F. Hare

OH EAST IS EAST and west is west and never the twain shall meet. . . ." This saying was never less true than in the case of the modern Army Aviator where a high degree of professionalism is demanded in two fields of almost separate endeavor. The officer must be a highly qualified aviator and the aviator must be a professionally skilled, branch qualified officer if he is to conform with the career plan outlined by Department of the Army.

Actually, however, this is almost a one-way street, with the aviation qualification a continuing part of the program. Very seldom is an Army Aviator burdened with branch duties while in a category I or II assignment. Albeit much can be learned during this period by observation and association that can be of use when rotated to category III duties. When the rotation to category III duties comes, not only must you be primarily a branch duty officer but you must also maintain an acceptable degree of flying proficiency.

Let us examine a category III assignment. What does it mean to the individual and, **just as important,** what does it mean to the unit which must support him?

The fateful day arrives. The Army Aviator has finished a period of complete qualification in aviation and now, careerwise, needs a tour of ground duty. The official envelope reveals orders that could read: "Joe Nilsweat assigned to combat infantry division with TDY en route to the advanced officers course, rotated to ground duty for a period of 12-18 months. This is a category III assignment."

Nilsweat looks at this with mixed emotion. But usually burning bright is the idea that this is a challenge; this is a chance to command a unit; this is a chance **to excel!** Just as Nilsweat's receipt of branch material orders was received with mixed emotion, so is his arrival at his troop duty unit and the supporting aviation unit.

Joe wants to command and as the unit needs a good commander, he is given the chance — with all the responsibility that involves. He wants to do an outstanding job and as a fulltime commander, therefore, flying must take a back seat and most times be done on weekends, holidays, or at night. This is right and necessary. It is important that Army Aviators make the most of their opportunities and be given positions of responsibility. If he claims he must fly during duty hours, we end up with aviators receiving such jobs as A&R officer, club custodian, and assistant staff officer. While all these assignments are an important part of the Army program, the young company grade officer aviator needs to **command.**

After having properly established himself, Joe takes his flight records, goes to the local airfield and says, "Here I am; I have to fly 80 hours per year and you must help me." The aviation company commander smiles though tears are running down his cheeks and schedules Joe for the various company SOP type checkouts. These usually consist of a trip around the local area, a demonstration of proficiency in various type aircraft and a quick instrument proficiency ride.

Joe tells the CO he'll have to arrange this for the earliest possible Saturday or Sunday. The commander is pleased to see that Joe is a well qualified Army Aviator. He is dual rated and twin qualified, with a current instrument card. He will be of great benefit to the aviation unit if at the end of the ground duty tour he remains at that post assigned to this aviation unit. Right now, though, this fine record adds up to a headache for the commander who must keep Joe proficient as the ARs dictate.

As the aviation commander says goodbye, he places Joe's name along with 30 others on ground duty in the division. Then he mutters to himself, "How can I support all these guys and still meet all my other commitments, especially since about 15 of these boys want to keep their instrument cards current?"

Capt Hare is assigned to the 3d Avn Co., 3d Inf Div, APO 36, N. Y., N. Y.

This type situation is not hypothetical. It exists in many divisions today. To support 30 ground duty aviators, your aircraft will fly about 2,000 hours per year in excess of normal requirements. Most ground duty aviators fly on weekends, holidays, and at night, with most of the initial checkout being conducted by unit IPs. As a result you find well qualified people avoiding an IP rating like the plague. You find instrument examiners getting grouchy because of instrument instruction and check rides on weekends. You find maintenance personnel unhappy because of having to crew aircraft at "odd ball hours." The CO gets impatient because the flying hours soar in excess of SB 1-1 and replacement parts lag. The final result is a poor availability rate. This problem is increasing. A sensible, realistic, forthright solution is needed.

Let's start at the beginning.

First of all, when Joe reports for the initial checkout he should be available for an unencumbered block of time. For example, a 10-day block out of the first 30 days the aviator is assigned should be made available. All necessary checks may be administered and if an instrument check ride is due, instruction and a check can be scheduled. Much of the checkout can be combined with normal missions, thus saving time and IPs.

Aircraft should be issued to these units **primarily** to support ground duty personnel. For example, for each five ground duty pilots issue one L-19. These would greatly reduce the number of excess hours on unit aircraft and would be scheduled so the ground duty officer, with his limited free time, would always have an airplane to fly. His instrument work would be done in TL-19Ds.

This system would standardize everyone in the L-19 and make for a safer and far less costly operation. Joe's other aircraft qualifications need not remain current; in fact, should not for safety reasons. The idea of permitting a ground duty pilot to fly a helicopter one month (for 3 hours), an L-20 for the other hour of required flight time, and then perhaps not get his time the next month (this happens), and the next month in an L-19 gives the pilot just enough time in each to be questionably proficient. There are exceptions to this, such as aviators qualified only in rotary wing aircraft. However, they should fly only one type helicopter.

The aviator on ground duty is a present, real problem. These ground duty tours are essential. A plan must be devised to handle this phase of the Army Aviators career program much as other phases of flying are governed. Flying for the category III officer needs to be simple, easy to schedule, and safe. This can only be accomplished by a clear-cut approach to the problem. Flying should not be a burden on either the ground duty aviator, his commander, or the supporting aviation unit.

MURPHY'S Law-ment

Major Richard K. Whitehouse, MSC

You've heard of the Law of Murphy
And the trouble it brings **one** to.
The **"one"** refers to the other guy,
It'll never happen to you.

If the part will go on backwards,
You can bet that's the way it'll be.
But if it's supposed to be backwards,
The front part is all that you'll see.

How can this possibly happen,
The pump on upside down?
You'd think that this installation
Was made by a circus clown.

It sucks when it should be blowing;
It blows where it ought to draw.
It's only obeying the simple rules
Laid down by Murphy's Law.

If "Murphys" prevent operation,
The cost may be only in time.
But if the result is malfunction,
Your chances may sell for a dime.

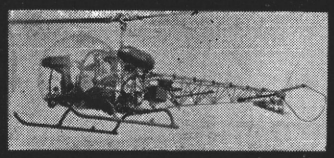
You can probably start with a "Murphy,"
You might even get off the ground.
But a "Murphy" cuts down your chances
Of being a long time around.

Now why should I talk to the pilots
When most "Murphys" are made by mechs?
Cause we flyboys must show those crewchiefs,
We know they have charge of our necks.

If we show them that we have an interest
And know that they're part of the team,
They'll take time to KNOW what they're doing
And "Murphys" will just be a dream.

L-19 BIRD DOG

H-13 SIOUX



U-1A OTTER

TWX

THE UNITED STATES ARMY BOARD FOR AVIATION ACCIDENT RESEARCH

Ex

HU-1 IROQUOIS

H-34 CHOCTAW

H-23 RAVEN

H-13E MAIN ROTOR BLADE damaged by smoke grenade thrown by passenger who had just left aircraft. Major damage. No injuries.

H-13E ENGINE FAILED in flight. Incident damage to tail rotor during autorotative landing. Engine failure caused by broken intake valve in No. 2 cylinder.

H-23D ENGINE MADE UNUSUAL NOISE in flight. Aircraft was autorotated to successful forced landing with no damage. Oil drain valve was left open after engine change.

H-13G STRUCK WIRE during takeoff from road. Tail rotor struck ground, breaking off tail rotor guard and both tail rotor blades. Left skid was torn off and aircraft came to rest upright. Major damage to tail rotor, tail rotor drive shaft, left skid, and main rotor blades. No injuries.

HU-1A LANDED HARD during practice autorotation. Main rotor blades flexed downward and severed tail boom. Major damage to main rotor blades and tail boom. No injuries.

AO-1 NO. 2 ENGINE VIBRATED and made unusual noise in flight. Aircraft completed precautionary landing with no damage. Investigation revealed hydraulic line at filter connection in right wing cracked around flare.

H-19D ENGINE BACKFIRED in flight. Rpm fluctuated and fell off rapidly. Successful forced landing was completed with partial power. Gear found stripped in right magneto.

U-1A TAIL ROSE during landing roll. Propeller and right wing struck ground and aircraft came to rest in 3-point attitude. Major damage to propeller, engine cowling, fuselage skin, and right wingtip. No injuries. Weather not a factor.

L-20A ENGINE FAILED after takeoff over water Aircraft stalled out during attempted 180° turn and crashed in nose-low attitude. Aircraft destroyed. Pilot suffered minor injuries. Cause of engine failure undetermined pending investigation. Engine had previous history of freezing in flight.

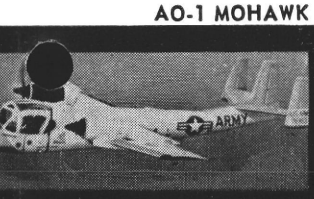
L-26C LANDING GEAR FAILED while aircraft was taxiing. Right main gear collapsed, causing major damage to engine, propeller, and underside of fuselage. No injuries. Suspect malfunction of right main landing gear downlock micro switch.

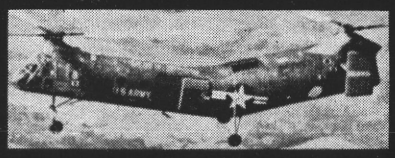
AO-1 LEFT SIDE DOOR opened during takeoff roll. Incident damage to door bracket and canopy. Investigation revealed that side door locking handle is subject to accidental opening. Study is being conducted to spring load locking handle with bungee cord.

H-13H HOVERED NEAR ground marker panel. Panel was swept up into main rotor blade. Major damage to main rotor blade. No injuries.

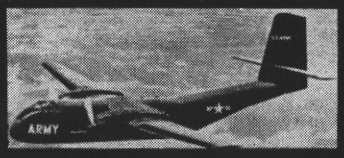
L-23D LANDED SHORT of runway. Nose gear sheared, causing major damage to nose section, both propellers, both engines, and right main tire. No injuries.

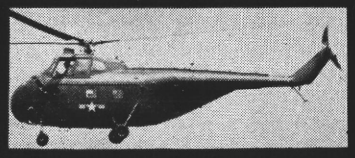
AO-1 MOHAWK H-21 SHAWNEE L-20 BEAVER





cerpts From Oct. and Nov.





L-23 SEMINOLE H-37 MOJAVE AC-1 CARIBOU H-19 CHICKASAW

HU-1A LOST RPM in flight and fuel pressure dropped. Aircraft completed forced landing with no damage. Fuel line from fuel control to injector nozzle failed.

H-34C ENGINE FAILED during application of power to bring aircraft to hover. No. 5 and No. 6 cylinders failed. Cause undetermined pending analysis.

HU-1A OIL PRESSURE dropped in flight. Precautionary landing was made and engine stopped at touchdown. Small piece of metal found lodged under plunger of engine oil pump, which caused loss of oil pressure.

H-34C CARRYING SLING LOADED L-19 settled during attempt to move forward. L-19 nose struck ground, causing L-19 tail to lift up and forward. L-19 tail struck H-34 on right side before it could be released. Incident damage to skin on right side of H-34.

H-21C EXECUTED STEEP FLARE during attempt to avoid wire after takeoff. Main gear and tail cone struck ground, causing major damage to tail cone skin, bulkhead, and one aft rotor blade.

H-34C CRASHED AND BURNED during attempted go-around from approach to mountain site. Aircraft destroyed. One passenger killed and four passengers sustained serious injuries. Crew of three escaped with minor injuries. Density altitude may have been factor.

L-19A WING STRUCK TENT. Aircraft cartwheeled and burned. Pilot and passenger were thrown clear of wreckage, but suffered serious injuries.

H-34 ENTERED GROUND RESONANCE while preparing to take off. Aircraft went out of control and rolled on its right side. Pilot and crewchief sustained minor injuries. Major damage to main rotor system, landing gear, tail boom, and tail rotor assembly.

H-13 CRASHED into wooded area. Aircraft destroyed. Crewchief killed. Pilot escaped with minor injuries. Suspect engine failure caused by fuel contamination.

H-21C LOST POWER and cylinder head temperature rose during flight. Aircraft completed precautionary landing with no damage. Caused by failure of carburetor gasket.

H-13H STRUCK WIRES during takeoff. Major damage to main rotor blades. No injuries.

And here's one from the Air Force —

H-19 STARTED RIGHT TURN during rearward flight. Full left rudder had no effect on rate of turn and throttle was closed to reduce torque. The aircraft continued turning right and full cyclic was required to keep it from rolling over when it hit the ground. Both nose gear struts were broken. No injuries. Drain plug had fallen out of gear box and was found lodged in section of tail rotor pylon cowling. Plug had not been properly lock-wired in position.

Uneventful

Captain James Burton, Inf

LATE IN JUNE, Lieutenant Fudd and Lieutenant Dudd, two sharp check pilots from a Texas installation, decided to make a cross-country flight to Fort Rucker in an L-20 to complete their annual minimums. Both pilots had over 1,000 hours first pilot time and were instrument rated, but had very little flying time in the L-20, in fact none in the last 6 months.

Both check pilots eagerly awaited their takeoff time (1600). While Lieutenant Fudd made a fast preflight, Lieutenant Dudd filled in a VFR flight plan by Victor Airways, figuring a 6-hour flight with a 1-hour fuel stop at Ryan Airport (Baton Rouge). After completing the flight plan, Dudd proceeded to the weather office to see Mr. Stormcaster, the Chief Meteorologist.

"Hi, Stormy. How's the weather look between here and Fort Rucker?"

Mr. Stormy answered, "Just got a 'Special' 5 minutes ago showing severe thunderstorms between Beaumont and New Orleans. They are moving from the coast northward and should dissipate by 2100 hours. The lowest ceilings along the route should be 1,000 feet in this area, with visibility normally 5 miles, but only ¼ mile in the heavy showers. Wind is light and variable, but the turbulence is moderate to severe in the vicinity of the thunderstorms."

Lieutenant Dudd picks at his ear a couple of times and finally asks, "Stormy, this is the last weekend of the month to finish our minimums. Can you give us VFR all the way?"

"Oh, I guess, as long as you stay out of heavy rain," answered Stormy.

The flight plan was then filed and Lieutenant Dudd walked out to the L-20 and the eagerly awaiting Lieutenant Fudd. "No sweat all the way. A few thunderbumpers around Lake Charles, but you know how the weathermen overestimate everything," said Dudd.

The two young lieutenants hop into their L-20, receive tower clearance for takeoff and break ground at 1642. The only thing eventful between the home field and Beaumont is an argument on whether to fly at 3,500 feet or at 5,500 feet. The argument is finally decided when Fudd says he has a slight cold and wants to fly at 3,500 feet.

At 1834 the two young aviators find themselves over Beaumont omni, and as they look ahead they see a very dark mass of clouds across their course to Lake Charles. Dudd, who had been flying for the last hour, decided it's Fudd's turn to fly since he doesn't want to make any decisions on the course from here—and besides he's hungry for the sandwiches and coffee his wife packed for their supper. He turns the controls over to Fudd and tunes in Lake Charles omni for the 1845 weather before opening the lunch.

At 1845 Lake Charles radio comes on with the weather. "Lake Charles. Thunderstorms in all quadrants. Very heavy rain with 30 kt winds, gusting 55 kt. Lafayette. Thunderstorms in all quadrants, with heavy rain, ceiling 1,000 feet."

Dudd turns down the volume, already hearing too much. By this time Fudd has leveled the bouncing L-20 off at 1,000 feet, approximately 300 feet beneath a very black cloud. Luckily the ground is right at sea level so they have room to spare. To stay away from the heavy rain areas, they are now 25 miles south of course and crossing the 190° radial of the Lake Charles omni when Dudd shouts, "Lower the nose; this thing's trying to swallow us up." Sure enough the large cloud overhead was lifting the L-20 very gently into its black mass at 1,500 fpm. At 500 feet everything was once again normal.

ETA at Baton Rouge was 2005. Since leaving Lafayette they had climbed to 2,000 feet and it was now dark. At 1945 the Baton Rouge radio broadcast a weather report. "Baton

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Capt Burton is now attending the Infantry Officers Career Course, Fort Benning, Ga. He has approximately 2,000 flight hours.

Rouge. Ceiling 400 feet. Visibility ½ mile."

"Can't be," said Fudd. "We have to land for gas, and besides it's not supposed to be below 1,000 feet."

The two young aviators could hear the minutes ticking by, for no one spoke. At 1955 they looked ahead and could see the lights of the city and gave a sigh of relief. After refueling, both aviators went into the weather office to see what was what.

The forecaster on duty showed them a graph of the ceiling at various times during the day. Sure enough, at 1945 it showed a 400-foot ceiling, which was caused by scud moving through the area, which had lasted for 20 minutes. The forecaster next showed them the radar screen which showed thunderstorms to the north of their intended course, but he explained they should have no further troubles.

The two lieutenants took off with an ETA at Fort Rucker of 2315. Both were breathing easy now and quite relaxed since they were at 2,500 feet in smooth air with no more weather to tangle with.

Fudd was half dozing when Dudd said, "This omni sure doesn't act right. The closer we get to Crestview, the weaker the signal seems to get."

When the ETA to Crestview was past both aviators couldn't figure out why their omni still seemed on the blink.

All of a sudden Fudd says, "Oh, no! Look at this voltmeter."

Sure enough, it was almost completely to the left. Deciding they must be without a generator, they turned off all their switches.

Here they were on a dark night in the vicinity of Crestview, they hoped, with no radios, light, or sectionals for navigation.

Dudd said, "I hope this flashlight still works; the last time I used it was 3 years ago when I was in flight school."

At 2310 the two almost lost aviators arrived over an airfield, but it did not have a split beacon light. Looking almost straight west they saw a split beacon and decided that must be Cairns AAF and that they were now over Dothan.

When they arrived at the airfield with the split beacon and saw a large airfield, lots of lights and several larger hangars, Dudd said, "This can't be Fort Rucker. When I was here last they only had a few shacks scattered around."

Fudd agreed. It looked like a large municipal airport to him too, but what about the split beacon?

After 10 minutes of circling the field both aviators came to the conclusion that this had to be Cairns AAF. They switched on their lights and the VHF radio. After 5 minutes of trying to contact the tower, they finally buzzed the tower. Then with Dudd shining the flashlight with the 3-year-old batteries on the instrument panel, Fudd managed to land the L-20 in one piece.

Several mistakes were made:

- They waited until the last possible weekend to finish their annual minimums.
- They did not fully believe the weather briefing they received.
- They flew too close to the base of clouds.
- They relied strictly on their radios for navigation and failed to pack along the necessary sectionals.
- They failed to cross-check all their instruments, hence failed to notice their generator was inoperative.
- A flashlight with 3-year-old batteries is hardly reliable. (But amazingly these particular batteries lasted until the following February!)

The two lieutenants also had several items to their credit:

- They were alert while flying in the vicinity of the thunderstorms and managed to stay out of the rain and clouds.
- They selected a refueling stop midway along their route.
- They checked the weather every 30 minutes while flying and also took time to check it during their refueling.
- ETA was figured between each omni station and, although the radio became inoperative, the ETA was known for Cairns AAF.
- At no time did the aviators panic, even when their destination looked strange.

Some of you may say that this flight was uneventful, which may be true, but others may say, "Wow! I'm glad I wasn't aboard that L-20."

If these two aviators had just received their wings, they may or may not have made the same mistakes, but, if they had, would they have safely landed at their destination?

The two aviators making the flight had much experimence between them and still they made mistakes that a primary student would never make.

Therefore, let us all examine our flying abilities and knowledge of flying. Whether we are recent graduates of the school or old and proven pilots, we can still make mistakes.

Will you be as fortunate as Lieutenant Fudd and Lieutenant Dudd?

A TIGHT SITUATION

Major Neil Reese, Arty

IN YEARS GONE BY there have been numerous aircraft accidents because of pilot confusion in the cockpit. Many lives have been needlessly lost in tight situations because men up front have hit the "panic button" instead of keeping calm and trying to work with the immediate problem at hand.

For the Army Aviator one of the most critical tight situations is flying in adverse weather where icing conditions are likely to be encountered. Under icing conditions a pilot must use every skill he has in keeping alert, and diligently use every method and technique he has been taught in training.

The amount of experience a pilot has, both in years of flying and types of weather flying, will be the most important factor in coping with a tight situation. Compare your flying experience, plus your weather flying, and determine what you would have done in the situation that is about to be told.

* * *

An L-23F was returning to a midwestern base after a trip to the southeastern section of the United States. On board were four passengers and two aviators plus baggage for all. The aircraft was at gross weight plus.

The return leg of the flight was approximately 1,100 miles. A flight plan was initiated for the entire leg of the flight, with a 1-hour ground stop slightly over half way for refueling and a bite to eat. The first leg of the flight was made without incident. Light rain was encountered approximately 30 minutes before landing at the intermediate stop. Rechecking the weather for final destination, the aviators found it to be 200 feet obscured and snow. So there was no other decision but to RON.

The following morning the aviators went to the airport to determine whether the flight could continue. The weather at the time was heavy rain with low ceiling. Since it was a commercial field, they checked weather at the FAA station. The local weather was heavy rain, ceiling 400 feet, temperature 33°, and a forecast of freezing rain turning to snow after 1300. Weather at destination was good; that was no problem.

The aviators were told the low pressure system was moving in a northerly direction. The first 40 minutes, including the climbout, would be the most critical for light to moderate icing conditions. When they turned in a westerly direction on the intended flight route the weather would improve and no

Maj Reese wrote this article while a student at the University of Southern California Safety Course. He is a Master Army Aviator.

icing condition should be encountered.

Weather was checked and rechecked for the next two hours. The weather facility of a nearby Air Force base was also checked by telephone, and about the same forecast was given. As the pilots were standing in front of the terminal a Convair taxied up to discharge and take on passengers before continuing on its flight.

As the pilot of the airliner was en route to his company operations, the two aviators asked the direction of his next leg of flight. He told them he was heading north in the same general direction, then turning slightly east. The airline pilot told them he would make a pilot report when 15 minutes out and they could receive the information in the company radio room. The report he sent back was promising: light rhime on climbout and at his cruising altitude, 6,000 feet, the temperature was a plus 6°C.

I might add there were no real psychological factors concerning the big rush to get home. The only factor was that one of the passengers (a colonel) had to be back the next morning to leave with the commanding general on an inspection trip to the West Coast.

The two aviators carefully weighed all the facts, the pilot report, the fact that the weather would turn better once they turned in the westerly direction on airways, and made the decision to go. The passengers were called, and while they were en route to the airport, the pilots filed.

The flight departed at noon. No ice was encountered on climbout and when cruising altitude of 7,000 feet was reached, heavy rain was the only thing to contend with. The most northerly checkpoint was reached with no difficulties; the position report and turn in the westerly direction made. The aviators heaved a big sigh of relief because the weather forecaster said this would be the worst part of the flight for any icing conditions, and so far no ice.

The next checkpoint (A) approximately 60 miles away was almost reached when suddenly, as one might say, "the roof fell in." Temperature began to drop rapidly and ice was forming on the leading edges of the wings. Checkpoint A was reported. Checkpoint B was 30 miles away. Between point A and point B ice began to build rapidly and airspeed was reducing. Just before reaching point B altitude could not be maintained and ATC was notified immediately. Point B had an airport with an omni approach but was reporting obscured with ¼-mile visibility and snow.

The aviators requested immediate clearance to an Air Force Base approximately 70 miles away for a GCA, even though the weather was reported 400 feet with freezing rain. ATC acknowledged immediately with the clearance. Within 60 seconds the aviators realized they could never make that. At point A, the weather was reported 300 feet, 1 mile visibility in snow. The airport minimums were 500-1 with an omni approach. At this point there was no other choice; so an immediate clearance was requested back to point A for an approach. The request was acknowledged within seconds.

Now put yourself in this position: the airplane had to come down, the facilities were there for one approach with no go-around because of the load of ice, the field was below minimums with 4 to 6 inches of snow on the ground, and it would not be easy to pick up the runway. Would this be a situation in which you wouldn't want to panic?

As the omni station was passed inbound to the field the trim tabs were found to be frozen. At between 400 and 500 feet the ground could be observed straight down, and the runway could be picked up between a half and a quarter of a mile from the field. Although the landing was hard, as the airplane stalled out at 110 knots indicated, it was on good old terra firma and six people heaved big sighs of relief.

After putting the aircraft in a cold hangar, it took 3 hours using a Herman Nelson heater to remove about any kind of ice you want to mention. The following day a more pleasant trip was made back to home base.

* * *

There are three points to be derived from the experience of this flight.

- Proceed with caution into areas where light to moderate icing is forecast.
- Don't panic in a situation like this. A calm collected approach will probably save your life.
- If there is ever a doubt about the weather, just recall that sign you have seen in many a base operations office: "It's better to be on the ground wishing you were in the air than be in the air wishing you were on the ground." I can refer you to two aviators who are firm believers in this slogan.

LANDING IN MOUNTAINS

V. Shishkin

THREE YEARS of flights on helicopters offer a possibility to share some experience in landing on selected areas in a mountainous territory. As the practice shows, it is impossible to achieve the same adjustment of rotor system for all helicopters. Therefore, the pilot must know special features of his helicopter and, first of all, the rotor pitch angles at which the engine develops the maximum speed while running on rated and cruising rpm rates. Without knowing these factors it is impossible to accomplish a safe landing or a successful takeoff in a mountainous territory.

During the preparation of Mi-4 to flights in a mountainous territory it is necessary to adjust the "pitch-throttle" in the following manner:

pitch = 8°30′ in all cases;
pitch = 10°30′ in all cases.*

Why do we select precisely these conditions, and not others?

*It is apparent the Russians have some method of manually adjusting the rotor blade pitch range for flying in varied climatic conditions and altitudes.

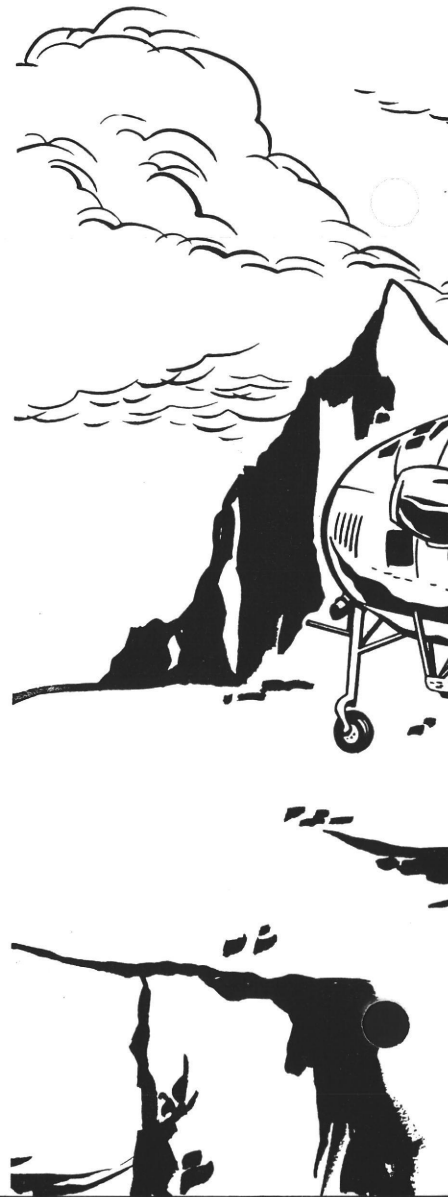
This article appeared in GRAZHDANSKAYA AVIATSIYA, a Soviet publication, and was translated by the Technical Documents Liaison Office, Wright-Patterson Air Force Base. V. Shishkin is the commander of a Russian helicopter squadron. Though some of his terminology is confusing, there is a striking resemblance between the problems he met during helicopter operations in mountainous terrain and those faced by Army Aviators under similar conditions. The Mi-4 helicopter, pictured in the illustration, appears most similar to the H-19 Chickasaw. It has a double tail boom tapering together at the aft end and clamshell doors opening in the rear.

This is because the "pitch-throttle" must be increased in landing on a high-mountain area, as well as in takeoff, due to a lower air density. And this leads to the fact that the tail rotor alone "is not enough" for damping the torque in left turn of helicopter.

In conjunction with this fact I shall narrate an unusual phenomenon which we have encountered during the first months of Mi-4 service. When the temperature of ambient air did not exceed during the landing +5 [to] +10° [assumed to be Centigrade], the controllability of helicopter was good. There was no tendency toward an unintended turn upon the full deflection of the right pedal. However, at temperatures of +20 [to] +30°, the helicopter began to turn left involuntarily.

First, we were inclined to assume that this occurs due to an incorrect adjustment and setting of the tail rotor. However, upon checking, it turned out that the adjustment data corresponded fully to the technical specifications.

What is the matter? As the time went by, we succeeded in finding the right answer to this



question. The following fact was revealed on one helicopter. Pushing down the right pedal was clearly insufficient to stop fully an involuntary left turn of the helicopter. We have decided to replace the lifting rotor and decrease its pitch from 11°20′ to 8°30′. The behavior of helicopter changed completely. The involuntary left turn disappeared. Upon deflection of the right pedal, the helicopter turned obediently rightward.

This is the reason we decided to retain exactly these parameters of setting the rotor blade angles. We should mention only that it is not advisable to select a rotor pitch less than 8° 30′. Otherwise, the full deflection of the left pedal on an engine failure may turn out to be insufficient.

And so, in preparing a helicopter for flights in a mountainous territory it is necessary to observe the following parameters:

pitch = 8°30′ in all cases;
pitch = 10°30′ in all cases;
pitch = 10°20′ at 2200 rpm with the lefthand correction.

We are forced quite frequently to select landing areas. The following recommendations are valid in this respect. First of all, we select a landing area as a rule on tops of the mountains. Normally, there are no tall trees on a mountainous plateau. And even if the trees are encountered, such occurrences are fairly rare and cannot impair a landing.

The mountainous plateau is covered with moss, 10-20 cm tall, under which many rocks are hidden. This fact must be always borne in mind, because these stones hamper the helicopter landing and exclude the possibility of landing in air-

craft fashion. The helicopter must be landed in such a fashion on high-mountain airfields, situated above the static ceiling of helicopter, and also on these airfields where the landing in helicopter fashion is impossible, due to high temperatures of ambient air, or due to a great flying weight and an insufficient resource of engine power. As regards the possibility of hovering, or of a vertical landing in a high mountain territory, this is determined according to a special nomogram for the given type of helicopter.

All these special features impose upon the aircrew an obligation to exercise the maximum caution in selection of landing areas. It may appear from the air that the area is flat and quite suitable for landing. This impression often turns out to be deceptive. A mountainous plateau always has a certain slope attaining 10-15°. In addition, one area can have several slopes oriented in different directions.

It is also necessary to take into account the presence of many hidden swamps and small lakes on the mountainous plateau.

Whenever it is necessary to land on an area, marked from the air, where the density of soil or snow cover is unknown, the helicopter commander should order his flight mechanic to debark, while the helicopter is hovering. The flight mechanic inspects the area, checks the soil density and, having ascertained its suitability, marks the landing place and signals his pilot to land. The landing should be accomplished in a rigorously outlined place.

Very important is an accurate determination of the wind direction and speed. We never encountered a case of a complete dead calm in our practice. Local winds prevail in mountains. The orientation according to the direction of wind, blowing at an altitude, is possible only when the plateau is not shielded by adjacent higher mountains.

It happens sometimes that higher mountains are situated near the plateau on which the landing is accomplished. In such cases, the wind direction is determined according to the smoke produced by dropped smoke pots, or by flares fired from the Very pistol.

On mountain areas we are always confronted with the vertical displacement of air masses, which should be also taken into account during the landing and takeoff.

The landing approach is accomplished, as a rule, upwind. At the presence of a side wind, the landing is also performed upwind. In addition, a supplemental windward turn of the helicopter is carried out during the hovering before landing, at the altitude of 2-10 m.

The landing with a lateral tail wind is forbidden.

The proper loading of helicopter plays the main and, in my opinion, decisive role in a safe landing on the area on a mountainous territory. The loading is determined according to nomograms on the eve of a flying day.

The full loading is permissible only in cases when a radio station, communicating the wind direction and speed, is available on the landing area, and also when the latter is prepared for the helicopter landing in aircraft fashion. Particularly complex is the first landing on the high-mountain area.

What advice and recommendations can be advanced in referring directly to the landing?

During the approach to a landing area our pilots glide to the altitude of 5 meters. On this altitude, at the speed of 20 km/hr, they fly over the landing place, inspect it thoroughly and depart for the second circle.

The second flight over the landing area is performed at the altitude of 1-2 m from the ground at the speed of 10 km/hr. This is done so as to reduce the speed to zero in approach to the landing place.

The landing on a high-mountain area is accomplished with the aid of "air cushion."

How can we determine whether the helicopter will hover at the given altitude with the given load?

During the first flight at the altitude of 5 meters at the speed of 20 km/hr we adjust by means of the "pitch-throttle" lever the setting angle to 8° 30′. The engine runs at the speed of 2600 rpm. The vertical speed of descent is absent. Thereupon, on the same altitude and at the same speed, we push evenly the right pedal forward. The helicopter turns to the right. This determines the "margin" of the right pedal, which prevents the danger of helicopter's turning left in landing.

At the same altitude and speed, the flight mechanic or the copilot reads the value of boost. It should exceed the required value by 25 mm Hg.

We shall analyze, for the sake of clarity, the following example. Let us assume that the landing is accomplished on the area at 1,000 m above the ground. We set the rotor pitch at 8° 30′ in the level flight at this altitude. The engine runs at 2600 rpm. We note the maximum value of boost, viz., 1025

mm Hg. In a flight under the prescribed conditions it is sufficient that the boost does not exceed 1,000 mm Hg. The excess of 25 mm is necessary to increase the speed of level flight in departure for the second circle.

The first approach to the landing area is essentially a ranging approach, basing on which we can determine fully the safety of helicopter landing.

Afterwards, we carry out the second approach for the purpose of landing. Its place is already determined accurately. It is no longer possible to depart for the second circle, because the power reserve is expended entirely for maintaining the helicopter near the ground at no speed. This must not be forgotten. Otherwise, we have no solid guarantee for a safe landing.

The helicopter landing from a hovering mode is not difficult in itself. However, we must bear in mind that descending below the level of landing area is absolutely forbidden in gliding to the landing. Otherwise, on reduction of speed, this may cause the dropping of helicopter on mountain slopes. In a mountainous territory, the vertical descent of more than 1 m/sec is forbidden in gliding.

The landing is accomplished toward an ascending slope. A virtually safe landing is possible on a slope, the incline of which does not exceed 5°.

The landing on an area with the incline of less than 5° must be carried out up the slope or, at least, across the incline forming the right bank. The landing on areas, the slope of which exceeds 5°, is forbidden.

We shall note that the landing of helicopter with the wheel under-carriage on the ground and ice covered thickly with a snow blanket should be accomplished strictly vertically with a minimum rate of descent.

In case of banking or lowering of the tail boom in landing of the helicopter, it is necessary to take off vigorously and either land on another place or hover. However, if the rpm rate of rotor is reduced to minimum, no attempts at the takeoff should be made. In this case, one should simply cut off the transmission and kill the engine.

In landing on places with a loose snow cover the helicopter should hover at an altitude insuring the best visibility. However, if the visibility deteriorates abruptly in descending, the altitude of hovering must be increased and a further descent accomplished so as to sweep the landing place with the air blast from the rotor.

It remains to be mentioned that it is forbidden to land in all cases when the pilot has no confidence in a safe outcome of the landing. In such instances, the pilot is entitled to unload the helicopter in hovering, or return to the takeoff point.

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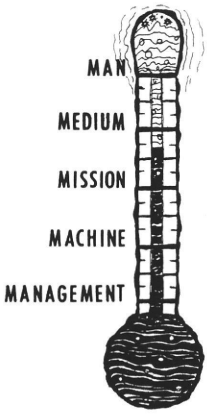

DESTINATION FEVER

Major S. H. Gillani, Pakistan Army

AS ARMY Aviators we are the carriers of a terrible disease. It is as deadly and damaging as cancer. But unlike some types of cancer it can be checked before it is too late. With a bit of determination it can be eliminated as well. This disease is "destination fever." It is characterized by a tendency to run home with minimum of delay, and sometimes (to the surprise of all of us) aviators do reach home with minimum delay — leaving widows and orphans.

Our world today desires speed. Aviators as well as travellers have developed a restlessness that sometimes makes demands on us beyond our capabilities and good judgment. We want to hurry back home—and end up in a big crash.

Destination fever is like all other fevers. It raises the body temperature and, if it remains unchecked, delirium sets in and the mind wanders to a point where the preflight is incomplete and flight planning leaves much to be desired. When the takeoff is executed, destination fever takes hold of the aviator; in other words, the primary cause factor of the potential accident has been initiated. It is a desire to get home or to some other place today.

Let us examine the cause factors which lead us to this running spree without any justification. In most cases this fever is self-created. To us something of importance is to be gained by reaching destination. So we take off with known maintenance deficiencies, questionable weather, and without using our best judgment. Statistics show that most of these important engagements usually terminate in a flaming heap of aluminum.

What are some of the things we can do to eliminate this fever. The best way to be sure of a cure is to stop flying, a solution many commanders have used much to their dismay. Obviously this is not the answer. We must educate the aviators, their commanders, wives, and the people who dictate the administrative procedures connected with flying.

Often a commander will release his aviators to fly somewhere with the remark, "As long as you get back for work Monday." This immediately establishes a goal. If the aviator is not instrument rated, experienced and current in flying, such a demand to return by target date and time will induce unsafe VFR flights.

Frequently, normal one-day missions are hampered by weather, late arrival of passengers, or minor maintenance. The plane is due back for a flight tomorrow, the wife wants to go to Bingo, the passenger must get home, and uncle won't pay per diem, so the young tiger takes off. Probably the most important factors influencing our hero's decision are his wife's desires and the fact that she did not allow him enough change to rent a BOQ.

To sum up, the famous five "Ms" constitute the factors leading to the destination fever. The physiological and psychological conditions of **man** are the main factors. He is to be trained to calculate the risk involved and then make rational decisions. **Machine, mission,** and **medium** are also important factors to be considered. Proper **management** also helps to cut down this destination fever.

What preventive measures can be used against destination fever? Man is the main cause factor. He is to be educated. Aviators are to be educated not to be caught by this habit of

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Maj Gillani wrote this article while a student at the University of Southern California Safety Course. He is a member of the Pakistan Army.

urrying things. He must calculate the risks involved; if it is to be taken, then he must have mission justification. A night away from home, few extra dollars in his pocket, and a promise to his wife should not lead him to the loss of human life and expensive machines.

Commanders are to be educated not to push missions beyond the capabilities of aviators under their commands. Their physical and psychological capabilities must be kept in mind before alloting them tasks. Fixed times and dates should be avoided if possible. Weather must be respected.

One night's delay will cost the Army per diem, the aviator's time, and passengers' return fare. But it may have saved a couple of thousand dollars, officers and crew lives, insurance, claims, and dependent benefits. This is a big saving. If we can educate ourselves, our commanders and staffs to our operational problems, teach our wives how to keep the aviator in a trouble free frame of mind, and allow our finance man to dole out a little per diem, we can help eliminate destination fever. All it takes to cure this fever is to do a 180, land and/or stay on the ground.

From The USAAVNS

DEPT OF TACTICS

The department is currently taking a hard look at one of Army Aviation's main supporting missions: aerial battlefield illumination. The last five years have seen only slight progress within this area. Equipment currently used is obsolete; consequently, the techniques employed are basically those used during the Korean War and World War II. A detailed study is being conducted on usable systems and will result in a guidance training circular in the near future.

CDO

AT 0900 HOURS on 11 September the 2nd Army Aviation Tripartite Conference opened at the British Army Air Corps Center at Middle Wallop, Hampshire, England. Nine United States delegates attended, including the following from Fort Rucker: General Easterbrook (senior delegate), Lt Col Gregorie, Lt Col Sibert and Capt Fitts. Colonel Sibert served as U. S. member of the Joint Secretariat. Delegations from Canada and the United Kingdom and United States observers from USAREUR and MWDP (Mutual Weapons Development Program) completed the assemblage. Before the conference many of the U. S. delegates saw the Farnborough Air Show.

The objective of the conference was to find ways to achieve standardization in procedure so that ABC (American, British, and Canadian) aircraft could easily interoperate on any future battlefield. Such standardization agreements are called SOLOGs (Standardization of Certain Aspects of Operations and Logistic) and frequently can be expanded to include all the services of all the NATO nations as STANAGs (Standardization Agreement).

The conference was most successful in accomplishing its objective. Agreements were reached on ground handling signals, ground handling and refueling procedures, common UHF frequency for Army Aviation in Europe, layout and marking of airfields, classes of

airfields and facilities to be found at each, combat zone navigation aids and terminal guidance procedures. A complete report is being printed in England.

The five-day tripartite conference proved an exceptionally fine opportunity for Army Aviators from Great Britian, Canada, and the United States to meet and discuss mutual problems. The British put on some excellent flying displays at Middle Wallop, including a spectacular "hands off" flight of the Benson Autogiro.

DEPT OF MAINT

The Organizational Aircraft Maintenance Supervisors Mo-

Continued on page 31

An Army Aviator's Letter to His Son

Captain Robert D. Mathias, CE

Dear Son,

Your letter to tell us that you've been accepted for flight training was wonderful news! This morning as I sat out under our favorite tree, my thoughts were filled with your future in Army Aviation.

But the more pleasant thoughts were shattered when a young aviator buzzed the house with a copter. That dangerous maneuver turned my thoughts back to the days when my wings were new.

You know, flying is a bit like driving an automobile; there are certain things you must do, and there are no shortcuts. Not only that, son, but you know how that young Dixon kid "hot rods" it and tries to show off with that cut down roadster of his. Too bad that we have some of his type in the flying business. Thank God that they are very few, but it was one of those who flew that copter over the house today. They are young and inexperienced and think that they are the greatest pilots that ever came out of flight school.

No, son, right now they are not the greatest pilots. Why? Well, I think probably the main reason is the lack of experience and that the newness of conquering a desire to fly has not worn off yet. It will take a little while with close association and a lot of supervision to get them through this stage.

Oh, your old dad went through this, too. When I got out of flight school, I thought I was God's gift to aviation. Fortunately, I was assigned to a unit that happened to have pilots that were just a little bit better than I was. Actually, they could fly circles around me. I got over my cockiness rather abruptly.

As soon as I was completely convinced that I wasn't the hottest pilot in the unit, I settled down to try to be the best in the outfit. At that time, being quite young, not married, and living a rather protected life, I was both mentally and physically qualified to fly as much as or more than the majority of our pilots, or so I thought at the time, anyway. Well, I really enjoyed flying, and took all of the flights that I could get. As time went by, I built up quite a number of flight hours; then a feeling of complacency set in. I gradually started taking chances that I knew I shouldn't take, but as I continually got away with no ill effects, I became bolder and bolder. Then it happened.

We were flying resupply missions for two units located on the outskirts of town. As any aviator knows, the shortest distance between two points is a straight line. Son, let me tell you right here that the shortest distance between two points is a straight line, but the safest distance between two points is not always a straight line.

An airplane or helicopter is similar to an automobile; being manmade and mechanical, it is susceptible to malfunctions. But an aircraft subject to a malfunction is not like an automobile that can just pull off to the side of the road or park on the pavement. It has only one way to go, and that is down.

Now, son, here is the whole point of my story. What would have happened this morning if the engine had quit on that copter pilot while he was over the housing area? The same thing that happened to me when I was flying that resupply mission going directly ove town. My engine quit, but no that I look back on it, I feel that I was the luckiest Army Aviator that ever put on a set of wings. As I found out later, my luck was due to a malfunction in a traffic stop light. The light turned green in the direction to empty the block that I had to land in but, because of a malfunction, did not turn green to allow traffic to proceed down that block. Consequently, the block was cleared of traffic when I touched down.

Now what would have happened today had this other pilot had a forced landing over the housing area? Could he have landed on Main Street with no traffic or children there? What

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Capt Mathias wrote this article while a student at the University of Southern California Safety Course. He is a Senior Army Aviator with more than 3,800 flight hours.

would our consciences have done if either of us had landed and killed innocent children?

Why ask these questions? Why couldn't we have taken a few minutes longer and flown around the town, following routes that would have given us good, ample forced landing areas in case of a malfunction? Why? Because we could save a few minutes and cut a couple of miles off the distance. This "malarkey" of something happening to me was strictly for the birds. Not only that, but it was getting late in the afternoon and as soon as we finished that mission, we were through for the day. And I had a date that night. What better reason could there be for being in a hurry?

You know, son, I think women are the greatest invention since the electric lightbulb, but if we don't slow down and think a little bit, they'll be about as much good to us as a burned out lightbulb.

Son, we give these young lads the best training in the world trying to make them good pilots. Training is not enough though. We must set up a continuous program to educate these lads. Only through good training and a continuous education program are we going to accomplish our mission of turning out good, sound, self-thinking, reliable aviators.

Man, plus Machine, equals Mission. Man, the human factor. Machine, the mechanical factor. A combination of the two when properly used will successfully carry out the Mission. Man is no better than the machine he flies in accomplishing the mission; nor is the machine any better than the aviator who flies it.

Our main aim is to successfully carry out the mission. The equipment (machines) is modern and up-to-date, and overall very well suited for our type work. Now, with a mission to perform and the suitable equipment to do it with, we have only one factor left in our "Three M" triangle—Man. Not just any man, though. We must have a well trained, highly educated man if we are to have a highly efficient operation. Our flight schools do an excellent job of giving the students the best flight training possible. Upon graduation, an aviator has every reason in the world to feel exalted. He has reached a milestone in his career.

Now that he has pinned on a set of wings, is his training completed? Definitely not. Now comes the practical application —let's call it the Extended Field Problem. Now we put put into practice the principles and hours of practice spent in flight training. Only through hours and hours of practice under proper supervision and guidance will our young aviator become a member of our highly efficient operation. Son, remember the old saying "Practice Makes Perfect"? Well, that is not quite correct in aviation. There are no perfect pilots. Some aviators have obtained fame and greatness by being close to perfect, but no one has yet reached the 100 percent mark; and it is quite doubtful they ever will.

Now, let's get back to the young pilot who buzzed the house this morning. What would you say made him do what he did? Flight training? No; I doubt seriously that maneuver was part of the curriculum. Complacency? Possibly so; very possible. But why? Complacency shouldn't be present in a highly efficient, well trained, well disciplined unit. Unless just maybe that isn't such an efficient, well trained, well disciplined unit.

Somewhere along the line, somebody has dropped the ball. This young aviator has not been getting the proper guidance and supervision. In some units a review or revision of the training program is necessary if such young men are to grow as capable Army Aviators. Constant training is a serious matter to those who approach perfection.

As I grow older in the profession, I hope to see the day when "buzzing" and other amateurish antics will be a thing of the past.

Forgive me son, if I've harangued, but I suppose I want to keep you from having "to buy" experience the hard way. I'm so proud that you've chosen to follow me in Army Aviation. Who knows — maybe one day before I retire we'll serve together!

Love,

Dad

Continued from page 29

bile Instruction Team which departed Fort Rucker 14 September 1961 for Fort Bragg, N. C., completed the scheduled instruction.

The team departed Fort Rucker again 16 October 1961 for scheduled instruction at Fort Sill, Okla. Upon leaving Fort Sill, the team will visit Fort Hood, Texas and Fort Benning, Ga. The team is scheduled to return to Fort Rucker on 12 December 1961.

CRASH SENSE

PREPARED BY THE UNITED STATES ARMY BOARD FOR AVIATION ACCIDENT RESEARCH

Samuel H. Schneider

Thomas C. Saunders

Stanley R. Hill

Santa Wears Gold Wings

SOMEONE recently took the trouble to check the record and found that the seven Phase B fixed wing flight instructors pictured had quietly presented the Aviation School with the best possible Christmas present. They had flown more than 19,200 hours without a single accident.

Day after day, this group of dedicated flight instructors perform what is probably one of the most hazardous jobs in Army Aviation — that of transforming fledgling pilots into highly proficient, fully qualified Army Aviators in a few short weeks. These are the men who teach short field techniques and strip work. Flying at 1,500 feet and below, subject to crowded skies and the worst available terrain, they often shoot as many as 12 to 15 landings on unprepared strips in a single hour's flying.

CRASH SENSE is proud to add its congratulations for this fine record.

James E. Wright

Edward L. Dunnavant

Weldon E. Glick

Charles F. Horne

A PRESENT FOR ROGER

Roger tossed the paper aside and looked at his wife.

Mouth set in a hard straight line, she glared back, hands on hips. "I don't care if it is important! You knew the Christmas Eve party was tomorrow night! Why did you have to volunteer?"

Roger pushed to his feet. "Elaine, you don't understand. It's not a case of volunteering. We have to get that aircraft back for proficiency flying during the holidays. The weather's been stinking for the past month and we haven't been able to get our minimums. As the most experienced pilot in the unit, it naturally fell to me to go and get it."

"The unit, the unit! That's all I ever hear! It seems that for once, especially at Christmas, you could give a little thought to your family! Or don't we matter any more?"

Roger bit back a sharp retort. He turned and paced to the window, stared at the falling snow. His mind traveled ten years into the past and he compared a mental picture of what his wife had been like then to what she seemed today. Elaine had been the darling of her family, campus beauty queen and popular member of a top sorority. Roger had vied with the whole male population of the senior class for her attention, a fact she reminded him of all too often lately. He thought of their first years together. Elaine appeared to thrive on Army life. When he applied for aviation training, she encouraged him, made an adventure of the moves and cramped housing.

"Roger!"

Roger's mind snapped back to the present and he swung around to face his angry wife: "What is it?"

"You haven't heard a word I've said!"

"I've heard enough!"

"Don't you shout at me!"

"Then get off my back!"

Elaine's face registered shock. She crumpled to the couch and burst into tears. Her sobs brought their 6-year-old daughter running from the next room.

The little girl ran to her mother. "Mommy, Mommy, what's the matter?"

Elaine pulled her hands from her face, threw her arms around her daughter. "It's all right, dear. Your father thinks he has to go away and I'm afraid he might not get back for Christmas."

The little girl stared at her father, buried her face in her mother's shoulder. "No, Daddy, no!"

A car horn sounded from outside. Roger stared at the tearful tableau of his wife and daughter. He flushed, cursed under his breath, wheeled around and stomped into the hall. Grabbing his Jeppesen case from the hall table, he pushed through the door and slammed it shut.

* * *

Roger arrived at the overhaul depot, 400 miles away, 6 hours after leaving home. He hurried across the darkening tarmac from the commercial terminal and entered the contractor's hangar. Cold air smelled strongly of engine oil and hydraulic fluid.

A watchman, timeclock strung over his shoulder, came forward. "Help you, Captain?"

"Yes, I'm here to pick up an L-20 for Fort Faraway."

"Yes sir. Boss said I was to tell you to call him. He left this number. Phone's on the wall over there."

Roger took the slip of paper and walked to the telephone. He picked up the receiver and dialed rapidly. After the third ring, a man's voice answered, "Hello."

"This is Captain Carter. I'm here to pick up an L-20 for Fort Faraway."

"Oh yes, Captain. I'm sorry, but we're going to have to

change the fuel pump on that plane. I tried to call you this afternoon, but you were already on the way. We didn't have a replacement pump and had to order one from the factory. It's due in on the morning flight. Looks like it'll be around noon before you can get away."

Roger's fingers clenched around the receiver. He fought back a curse and controlled his voice with an effort. "Thanks. I'll check with you in the morning."

Roger trudged back to the commercial terminal, hailed a cab and rode into town. He checked into a hotel, bought a newspaper and went up to his room, determined to get a good night's sleep.

A hot shower helped to relax tense muscles and he propped himself in bed to read the paper. An image of Elaine's tearstreaked face kept his mind from concentrating on the paper. He lit a cigarette, shifted his position and forced his attention back to the paper. The image came back.

Roger slammed the paper to the floor, sat up on the side of the bed and lit another cigarette from the butt of the first. He puffed furiously, eyes on the dark window and thought again of the morning quarrel.

For the past few years, Elaine had developed an irritating habit of twisting facts around until he appeared in the wrong each time a flight interfered with her plans. She had become a social butterfly, and her days and nights were almost completely absorbed by outside activities. He remembered the many cold suppers after her late afternoon bridge parties; the times he had to fix his own breakfast or go without because Elaine was sleeping from a late hen party.

The hours passed slowly. Roger was surprised when he found his cigarette package empty. He got another package from his Jeppensen case and tried again to read the paper. Finally, when the hands of his watch reached four a.m., he dropped to the bed, exhausted, and drifted into a troubled sleep.

It seemed his head had only touched the pillow when the telephone rang. "Good morning. Captain. Seven o'clock."

Roger dropped the phone, struggled up and began dressing. His mouth tasted awful, his head ached, and he moved wearily through the hall to the elevator.

The coffee shop was crowded and Roger took a stool at the counter. He ordered scrambled eggs, but when they came his stomach churned in rebellion and he lost his appetite. He managed to get down a cup of coffee, left the hotel and taxied back to the airport.

Roger entered the contractor's hangar and asked for the foreman. He was directed into a small office, introduced himself to a stout man behind the desk and asked: "Are they getting my L-20 ready?"

"Sorry, Captain. We just got word that the morning flight will be an hour late. Looks like it'll be closer to one o'clock before you can get off."

A whole morning to kill and 400 miles to fly! Roger walked through the crowded hangar impatiently.

* * *

He pushed through the weather office door, 175 in hand, promptly at one o'clock. The Air Force weather officer took his clearance and glanced over it quickly.

The forecaster shook his head. "We've had two pilots' reports in the last hour giving severe turbulence over the mountains. It's IFR all the way and you won't be able to see the turbulence before you're in it."

Roger pulled hard on his cigarette, studied the sequence reports and tried to decide what to do. His mind wandered to Elaine and his daughter waiting at home. There was the Christmas Eve party and the toys to be gotten out of layaway; there was the final decorating of the tree; and there were his parents-in-law due in tonight. He smashed his cigarette into an ash tray and thought, I've just go to go!

* * *

Roger held the idling L-20 at the end of the runway and copied his IFR clearance on his kneepad. He received tower clearance, taxied onto the runway, lined up and opened the throttle.

The Beaver entered the overcast at 300 feet and Roger checked his watch. He glanced at the ADF needle, turned left 5 degrees and continued climbing on course. When the altimeter showed 7,000 feet, Roger leveled off. He passed his first reporting point 20 minutes after takeoff and gave his position report.

Two hours out, flying in solid cloud, the Beaver began to rock a little. Roger tightened his safety belt and concentrated on the instruments. The right wing dropped and he brought it up with aileron. His eyes moved across the instruments.

The vertical speed needle fluctuated 500 feet both sides of zero, then swung wildly down to 4,000 feet per minute descent. Roger cross-checked the altimeter and the hundred foot needle was whirling around

the dial. His hand shot forward, shoving throttle and pitch to the end of the quadrant.

The altimeter continued to unwind. When it showed 4,000 feet, Roger banked the aircraft steeply, attempting to reverse course. Suddenly, the aircraft dropped out of the overcast and he saw a wall of green ahead.

He rolled out of the turn, hauled back on the wheel, and watched in terror as the trees shot up to meet him.

Roger held his breath and prayed. The Beaver's nose slowly rose above the treeline, but the aircraft continued to mush downward from the steep pullout.

Roger heard a loud snap and the aircraft shuddered, but it was above the trees and flying. He let out his breath slowly, hands clenching the corded wheel and feet beating a nervous tattoo on the rudder pedals. Slowly, ever so slowly, his nerves calmed. He leveled off about 300 feet above the trees and gingerly tested each flight control. The Beaver responded to his pressures normally and he began looking around outside.

A flash of green caught his eyes and they focused on the left wheel. There, wedged between wheel and strut, was a 2-foot branch from the top of a pine tree. It had been that close!

Despite the cold air, Roger's uniform was soaked with sweat. He looked around further, searching for a way out. Clouds merged into the trees of the hilltops all around. He was hemmed in a valley 5 miles long and 3 miles wide. But there below him lay a perfectly straight two-lane asphalt highway.

Roger circled the highway, selected a strip where there were no road signs or culverts, and planned his approach.

The Beaver touched down lightly in perfect three-point attitude and rolled straight ahead to a stop. Roger cut the mixture, waited for the prop to stop and flipped off magneto and battery switches. His hands dropped to his lap and he sat there a long while with only his eyes moving. They drank in the snow-covered fields and evergreen forests along the sides of the road. All was quiet and still. But it was a living, breathing silence—the best Christmas present Roger would ever have!

IT COULD HAPPEN TO YOU

Al Most December 1961
Editor, It Could Happen to You
U. S. ARMY AVIATION DIGEST
Dear Al:

Prior to takeoff on December 24th, I computed my fuel requirements as five bales of hay and six quarts of oats for an 8-hour trip. I was extremely busy wrapping packages because of some last minute requests and left the fueling to one of the elves.

The heavy increase in population during the past few years, due greatly, I suspect, to Army Aviators, caused a critical cargo load for the trip. I was so concerned about this that I neglected to personally check the fuel load during preflight. Also, because of unseasonable temperature, density altitude was some 2,000 feet above normal.

I received clearance, lined up, and applied the whip. Although deerpower seemed normal, the craft appeared unusually sluggish and we were using up the snowway at an alarming rate. I saw the 4,000-foot marker flash by and stared at the airspeed indicator. With only 1,000 feet of snowway left, it showed 10 knots under liftoff. It was definitely time to abort. But I just couldn't haul back on the reins with all those waiting empty stockings.

Finally, in the last 50 feet, we staggered off, mushing over the first of several glaciers. I held Rudolph down as low as I dared to build up airspeed and, after what seemed an eternity, we entered normal climb. My beard was soaked with sweat and I was slightly damp in various other locations. After I leveled off, I opened the fuel box and counted, to my utter amazement, ten bales of hay and a dozen quarts of oats. I estimate we were at least 500 pounds over gross at takeoff!

Believe me, Al, I've learned my lesson the hard way!

S.C.

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LET'S TAKE A LOOK AT SURVIVAL I, . . . II, . . . III Lt John Wallace; Capt Robert G. Elton, Inf; Lt John A. Hurley, USAF	Aug	1
MACHINE ANALYSIS	Aug	26
MORE THAN A BLIND SPOT Brig Gen Carl I. Hutton, USA	Jan	1
NEW ACCIDENT REPORTING FORM	Sep	25
A NEW LOOK AT L-19 GROUNDLOOPS William R. Gaines	Aug	10
NEW LOOK TO AIRCRAFT ACCIDENT PREVENTION Maj William J. Hix, Arty	Jan	23
NILSWEAT AND THE MAPS Capt Lowell Mikles	Dec	3
REPORT TO THE STOCKHOLDERS Lt Col Morris G. Rawlings	Feb	4
RESCUE . . . ON TIERRA DEL FUEGO	Aug	8
ROUTINE FLIGHT Capt Pleasant H. West, CE	Oct	21
SAFETY IN ACTION William E. Carter	Sep	12
SOPHISTICATED LADIES	Nov	6
SORCERER'S APPRENTICE Richard K. Tierney	Feb	1
STEAM FROM THE COFFEE CUPS Lt Raleigh R. Meyer, Jr., Arty	Mar	24
TAKES TWO TO TANGO	Jul	20
A TIGHT SITUATION Maj Neil Reese, Arty	Dec	22
TO GO OR NOT TO GO CWO John H. Green, TC	Aug	28
TRUTH OR CONSEQUENCES	Feb	24
TRY IT DRY Maj Pierce L. Wiggin, USAFRes	Mar	28
20/20 HINDSIGHT	Apr	1
UNEVENTFUL Capt James Burton, Inf	Dec	20
A WALK DOWN THE FLIGHT LINE Thurber Phillips	Jun	27
WHAT ARE YOUR ODDS?	Jul	6
WHAT WELL DRESSED PILOTS SHOULD WEAR Capt A. A. Bezreh, MC	May	6
WHILE ON FIRM GROUND	Mar	30
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Tactical Employment

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ABOVE THE BEST—BEHIND THE REST Col Allen M. Burdett, Jr., Inf	May	1
CHOPPERS AWEIGH Lt Robert D. Stachel, Inf	Mar	1
EXERCISE SWIFT STRIKE Lt Col Donato N. Vincent, TC	Nov	1
HELICOPTER VULNERABILITY IN AN ACR COMPANY Capt W. A. Johnson, Jr., Inf	Jun	14
A NONRATED INFANTRYMAN LOOKS AT ARMY AVIATION Col G. Harry Huppert, Inf	Mar	12
WHY LOW FREQUENCY NAVIGATIONAL AIDS? Maj Martin V. McInerney, USAR (Ret)	Aug	20

Training

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AERONAUTICAL ENGINEERING PROGRAM IN ARMY AVIATION Capt Edward P. Lukert, Jr., Inf	Jul	13
AN ARMY AVIATOR'S LETTER TO HIS SON Capt Robert D. Mathias, CE	Dec	30
CHOPPERS AWEIGH Lt Robert D. Stachel, Inf	Mar	1
DO IT YOURSELF AIRCRAFT MAINTENANCE TRAINING Col Robert H. Schulz, Inf	May	22
EXERCISE SWIFT STRIKE Lt Col Donato N. Vincent, TC	Nov	1
FEAR WITHOUT PANIC Lt Frank S. Stewart, Arty	Jan	7
FORT LEE OFFERS AIRCRAFT REFUELING SEMINAR	Mar	Back
GETTING STARTED ON THE GAUGES Capt James A. McDonald, Arty	Jun	23
GOOD (?) OLE DAYS Leo E. Carver	Feb	12
HOW'S YOUR INSTRUMENT TRAINING PROGRAM? Sp-4 Robert M. Grant	Aug	31
THE IMPORTANCE OF PLANNING Robert M. Dickinson	Sep	5
A KNOCK ON THE DOOR Capt Gerald W. Larson, Inf	Apr	8
LET'S TAKE A LOOK AT SURVIVAL I, . . . II, . . . III Lt John Wallace; Capt Robert G. Elton, Inf; Lt John A. Hurley, USAF	Aug	1
MAINTENANCE PERSONNEL TRAINING PROGRAM Lt Theodore S. Chase, TC	Sep	9
REPORT ON BOOTSTRAP Capt Theo C. Watkins, TC	Dec	6
TC TRAINING COMMAND	Jul	26
WHAT IS AN EXAMINER? Maj Robert G. Culbertson, Inf	Feb	20

Weather

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INFLIGHT WEATHER ADVISORIES	Aug	30
RO-T-BUMPER Capt Donald M. McTigue, Armor	Jul	11
ROUTINE FLIGHT Capt Pleasant H. West, CE	Oct	21
TEN WEATHER TIPS FOR PILOTS	Jun	Back
THUNDERSTORM PILOT TECHNIQUE Capt James Bishop, Arty	Jul	9
WHAT ARE YOUR ODDS?	Jul	6

Departments

CRASH SENSE	Jan-Dec
FALCON'S NEST	Jan-Feb Apr-Dec
MEMO FROM FLIGHT SURGEON	Jan-May Sep
PUZZLER	Jan-Feb
TWX	Jan-Dec